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ORIGINAL ARTICLES.

THE CLIMATIC CAUSATION OF CONSUMPTION.

Read in the Section of State Medicine, at the Fortieth Annual Meeting of the American Medical Association, June, 1889.

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In order that one may be justified in bringing here an elaborate paper with extensive tables and illustrative diagrams, it is incumbent on the writer to make sure that he has either facts of importance which have not been published, or such new mode of grouping facts previously known as shall yield new and useful knowledge, especially when, as in this instance, the title of the paper is similar to that of other papers by the same person. Therefore I hasten to assure you that there are included in and with this paper facts which, so far as I know, have not been published, and others which have not in connection with this subject.[1]

This grouping of evidences on this subject has for its main purpose the learning whether three important generalizations relative to consumption are antagonistic to each other, as has commonly been supposed, or whether there are facts which serve to bind them together and harmonize them, and thus make each of the classes of facts upon which these generalizations are based tend to support a still wider generalization, which shall include all the preceding ones.

The general law to which I shall first give attention is the one established many years ago by Dr. Henry I. Bowditch, of Massachusetts, and nearly the same time in England by Dr. Buchanan. I refer to the generalization that residence on low, moist ground tends toward the occurrence of consumption.

Next in order, and in connection with the first, I shall deal with a generalization to which, during recent years, I have myself been asking attention. I refer to the proposition that exposure to the inhalation of cold dry air tends toward the production of consumption—that, in fact, this is a *controlling* cause of the disease.

Thirdly, the dominant generalization of our own time, that consumption has one *specific* cause, and that cause the *bacillus tuberculosis*, will be considered, or at least acknowledged.

At first thought these three propositions appear to be incongruous, and I think there is generally an idea that only one of them can be true; but I may here anticipate one conclusion in this paper by saying that it seems to me that each one of these propositions rests upon a secure foundation, and that as soon as this is accepted as established it will be possible to hold a much more complete and useful view of the causation of consumption than has previously been possible—a view which shall recognize the facts (1) that inoculation of a susceptible animal with the *bacillus tuberculosis* generally tends to cause consumption in that animal; (2) that, notwithstanding a wide dissemination of this specific cause, accidental inoculation with it, or its permanent lodgment in the human

[1] *List of Tables and Diagrams forming the Bases of the Evidence in this paper:*

Table 1 and diagram 1—Croup, and temperature in Massachusetts.

Table 2 and diagram 2—Croup, and absolute humidity in Massachusetts.

Table 3 and diagram 3—Consumption, and temperature in Massachusetts.

Table 4 and diagram 4—Small-pox, and temperature in Massachusetts.

Table 5 and diagram 5—Diphtheria, and temperature in Massachusetts.

Table 6 and diagram 6—Pneumonia, and temperature in Massachusetts.

Table 7 and diagram 7—Scarlatina, and temperature in Massachusetts.

Table 8 and diagram 8—Temperature, and sickness from pneumonia in U. S. armies.

Table 9 and diagram 9—Sickness from consumption in white troops, U. S. army, and temperature, 1862–5.

Diagram 10—Temperature, and deaths from phthisis in London, thirty years.

Diagram 11—Temperature, and sickness from consumption in Michigan.

Diagram 12—Bronchitis, and temperature in London.

Diagram 13—Sickness from croup, and temperature in Michigan.

Diagram 14—Temperature, and sickness from respiratory diseases in India, three years.

Diagram 15—Sickness from influenza, and temperature in Michigan.

Diagram 16—Sickness from tonsilitis, and temperature in Michigan.

Diagram 17—Temperature, and sickness from bronchitis in Michigan.

Diagram 18—Sickness from pneumonia, and temperature in Michigan.

Diagram 19—Absolute humidity, and sickness from pneumonia in Michigan.

Diagram 20—Pneumonia, and temperature in London, England

Diagram 21—Temperature, and sickness from scarlet fever in Michigan.

Diagram 22—Deaths from small-pox, and temperature in London, England.

Table 23 and diagram 23—Deaths from consumption in white troops in U. S. armies, and temperature.

Table 24 and diagram 24—Sickness from diphtheria, and temperature in Michigan.

These Tables and Diagrams will appear in THE JOURNAL of Jan. 25 and Feb. 1, 1890.

organism, is more favored under certain climatic conditions than under others; (3) that even after its introduction and lodgment in the organism, residence in cellar-like places tends to make the disease more fatal than does residence in more elevated, well-drained, warm and sunny places.

It has been generally understood that there are influences associated with low and wet localities, and, by contrast, with high and dry localities, which it is especially important for mankind to learn and heed; and yet the systematic attempts to obtain a scientific knowledge of the nature of these influences, or even their extent, have been very few. Some years ago two prominent physicians, one in this country, Dr. Henry I. Bowditch, and one in England, Dr. G. Buchanan, almost simultaneously undertook to learn the influence of residence upon low, wet ground on that most important of all diseases, consumption. More recently Dr. William Pepper has attempted to collect the evidence on this subject throughout the State of Pennsylvania.

DR. BOWDITCH'S INVESTIGATIONS IN MASSACHUSETTS.

Dr. Bowditch has said that the two following propositions contain the essential points of his address on this subject:

First.—A residence on or near a damp soil, whether that dampness be inherent in the soil itself, or caused by percolation from adjacent ponds, rivers, meadows, marshes or springy soils, is one of the primal causes of consumption in Massachusetts, probably in New England, and possibly in other portions of the globe.

Second.—Consumption can be checked in its career, and possibly, nay probably, prevented in some instances by attention to this law.[2]

These lines of proof, or argument, are drawn from the following sources:

1. Massachusetts State registration reports.
2. Medical opinion of Massachusetts, as embodied in the returns made to me, as a committee of this Society, these returns consisting of written reports from resident physicians of 183 towns.
3. Actual statistics of deaths from consumption, received from such correspondents. Some of these statistics are but *incidentally* mentioned, while others are from towns, districted and carefully examined with reference to the relative prevalence of consumption in the different districts. In some of the most important of these the examination was made without my correspondent or myself being aware of the existence of any law such as that which I shall present at this time.
4. Peculiarities of certain towns and of villages in the same townships, in some of which consumption is quite prevalent, and in others much less so, these differences being connected most closely with corresponding differences in the amount of moisture of the soil of said places.
5. Certain well-known houses which, in various towns, are known by the inhabitants and physicians to have been long noted as the abode of consumption, and in some of which several families have been, during the past fifty years, cut off by the disease without the least suspicion on the part of the occupants of the fatal position in which the houses were placed.
6. Confirmatory facts, statistics and opinions from Rhode Island, Maine and New Hampshire.
7. The medical statistics given in the report on the health of the United States army, strongly supporting the idea of the existence of the same law and the operation of it over the whole of the United States.
8. Results of my own practice since I first became convinced of the truth of the law, said results consisting of (*a*) statistics from my private medical record; (*b*) results actually derived from my choice of localities for consumptive patients, based on a belief in the law.[3]

[2] Med. Com. Mass. Med. Soc., Vol. x, No. 11, 1862, p. 67.

DR. BUCHANAN'S INVESTIGATIONS, IN ENGLAND.

Dr. Buchanan's very important contribution to our knowledge of this subject is so well summarized by Dr. William Pepper, that it seems best to quote from him, as follows:

The ninth and tenth reports of Mr. John Simon, Medical Officer of the Privy Council, contain the results of Dr. Buchanan's work, which was carried on in 1865, '66 and '67. Through this investigation it was discovered that in certain English towns where the drying of the subsoil had been accomplished by the construction of sewers, etc., and where the water supply had been improved, the mortality from phthisis had decreased. In Salisbury the death-rate from phthisis had fallen 49 per cent.; in Ely, 47 per cent.; in Rugby, 43 per cent.; in Banbury, 41 per cent.[4] In towns where no improvements had been made, or where the conditions were already good, there was no such corresponding change in the death-rate.

Dr. Buchanan summarizes the facts brought out in his investigation of phthisis in Surrey, Kent and Sussex, as follows:

There is less phthisis among populations living on pervious soils than among populations living on impervious soils.

There is less phthisis among populations living on high-lying pervious soils than among populations living on low-lying pervious soils.

There is less phthisis among populations living on sloping impervious soils than among populations living on flat impervious soils.

This connection between the iufluence of soil and phthisis was established by—

1. The general agreement in phthisis mortality between districts that have common geological and topographical features that are of a nature to affect the water-holding quality of the soil.
2. By the existence of a general disagreement between districts that are differently circumstanced in regard to such features; and
3. By the discovery of pretty regular concomitancy in the fluctuation of the two conditions from much phthisis with much wetness of soil to little phthisis with little wetness of soil.[5]

In his Tenth Report as Medical Officer, for 1867, Dr. Buchanan says:

But the connection between wet soil and phthisis came out last year in another way, which must here be recalled —(*d*) by the observation that phthisis had been greatly reduced in towns where the water of the soil had been artificially removed, and that it had not been reduced in other towns where the soil had not been dried.

5. The whole of the foregoing conclusions combine into one—which may now be affirmed generally, and not only of particular districts—that *wetness of soil is a cause of phthisis to the population living upon it.*

Dr. Buchanan quotes from the Seventh Annual Report of the Registrar-General for Scotland, from which I extract the following:[6]

[3] Med. Com. Med. Soc., Vol. x, No. 11, 1862, pp. 68--70.

[4] "Worthing, 36; Leicester, 32; Macclesfield, 31; Newport, 32; Cheltenham, 26. Bristol, 22; Dover, 20; Warwick, 19; Croydon, 17; Cardiff, 17; and Merthyr, 11;" according to the Medical Officer, page 15, Tenth Report Med. Officer of the Privy Council, 1867.

[5] Trans. Am. Climatolog. Assoc., May, 1886, N. Y., 1887, p. 89.

[6] Tenth Report Medical Officer, Privy Council, 1867, p. 109.

Let us see how such an explanation would agree with the very different proportion of deaths from consumption which occur in the eight principal towns of Scotland. Taking a five years' average (1857 to 1861 inclusive), it is found that, supposing all these towns are brought to an uniform population of 100,000 persons, there died annually from consumption 206 persons in Leith, 298 in Edinburgh, 310 in Perth, 332 in Aberdeen, 340 in Dundee, 383 in Paisley, 399 in Glasgow, and 400 in Greenock. The fact is, that if each town had been arranged in the order of comparative dryness of its site, they would almost have arranged themselves in the above position—Leith and Edinburgh the most free from consumption, and also having the dryest sites; Glasgow and Greenock the most ravaged by that disease, and beyond all comparison situated on the dampest sites. The above fact, then, with regard to the towns, corroborates, in the most striking manner, the conclusions of Dr. Bowditch, and should be a valuable help to the sanitary reformers, as to the very important measures which it is their more especial province to carry out.[7]

Referring to the conclusions based upon these investigations by Drs. Bowditch and Buchanan, Dr. R. Thorne Thorne, in his "Progress of Preventive Medicine during the Victorian Era," page 51, says:

I am aware that, in his sixth report (1879) on the Combined Sanitary District of West Sussex, Dr. Charles Kelly, basing his views on certain experiences derived from that rural area, has expressed a doubt as to the correctness of these conclusions. He says that the phthisis death-rate has been "distinctly lowered" in that district "in recent years," "while very little, if any, change has taken place during the same period in the drainage of the soil." Without entering into any criticism of some of the statistical data brought forward by Dr. Kelly in support of his views, I would here merely note, 1, that a large amount of agricultural drainage which had then already been effected throughout the kingdom would be expected to have produced a very similar result in rural districts to that brought about by sanitary drainage in towns; and 2, that Dr. Kelly offers no explanation of the definite and striking relations shown by Dr. Buchanan to have existed between the amount of diminution of phthisis death-rate and the extent and permanence of the lowering of subsoil water.

I have studied, with great interest, Dr. Kelly's "Sixth Annual Report," for West Sussex, published in 1880, as also one or two of his recent reports; and although I do not conclude that the facts and considerations he publishes controvert those published by Drs. Bowditch and Buchanan, they are of value, and especially in suggesting that coincidently with considerable progress in improved sanitary conditions of the surroundings, such as improved water supply, drainage, sewerage, etc., and improved methods of living, there has been apparently a great lessening of the mortality from consumption. Dr. Kelly says:

The great difference in the amount of consumption is probably dependent upon several causes. The improved state of the cottages, the rise of wages leading to the children being better clothed and fed, the increase in railway communication, which tends to diminish intermarriage, and to cause more interchange of population—all these changes, social as well as sanitary, have had their share in the improvement.

In his Fourteenth Annual Report, page 188, Dr. Kelly says:

[7] Tenth Report Medical Officer, Privy Council, 1867, p. 110.

It cannot be maintained that [all] deaths which used to be registered as phthisis are now included under lung diseases, because although there is an increase under the latter head, it is by no means equal to the decrease under phthisis.

Dr. Kelly, therefore, still claims that there has been an undoubted decrease of consumption in his jurisdiction.

Dr. Kelly's results reinforce the evidence heretofore collected, as to the influence of nearly all sanitary improvements in decreasing consumption, but they do not seem to me to have any force toward breaking down the evidence collected by Drs. Bowditch and Buchanan.

DR. PEPPER'S INVESTIGATIONS, IN PENNSYLVANIA.

Dr. Pepper's "Climatological Study of Consumption in Pennsylyania" seems to have been well planned, and carefully executed, but it did not yield results as convincing on the subject of the relation of soil moisture to consumption as did the investigations by Drs Bowditch and Buchanan, probably because of less perfect records of vital statistics in Pennsylvania, and perhaps also because of less attention having been given to the subject by local physicians in that State.

A few selections may be instructive:

It will be observed at once that those portions of the State where phthisis is rarest are the most elevated, having a general altitude of 1,500 to 2,000, or, better still, of 2,000 to 3,000 feet; while, in proportion as we enter districts of lower general altitude, we find correspondingly increasing rates of mortality from consumption.[8]

It may be noted that in Erie county, which has considerable average elevation, the mortality may be influenced by the proximity of the lake, and by the presence of a considerable body of low, wet land.

It will be seen further on, in the more minute study we have been able to make of Philadelphia, that the influence of elevation and of density of population appears to be considerable, and in accordance with what we have above stated.[9]

Dr. Bowditch and Dr. Buchanan each gathered evidence, from several sources, the combined force of which was very great, and after their results were united their conclusions were irresistible. As they have never been successfully controverted, it seems probable that the laws which they formulated will stand as a secure foundation upon which we may safely build. Wm. Pepper, M.D., LL.D., the distinguished Provost of the University of Pennsylvania, has said:

It is manifestly difficult to subject this theory to searching and conclusive investigation; but, so far as investigation has been made in other portions of this country or abroad, the evidence has tended to confirm Dr. Bowditch's position.[10]

But, if the grand truth, for which we are so much indebted to him, is really a truth, how comes it that the great reduction in consumption which should have followed its discovery has been as yet so little realized? There are, prob-

[8] Trans. Am. Climatological Assoc., May, 1886. New York, 1887, p. 98.
[9] Page 99.
[10] Trans. Am. Climatological Assoc., 1887, p. 88.

ably, several reasons, such as the slow progress which any such truth has in gaining acceptance, even among the thinking classes; but, in my opinion, one chief reason for the non-acceptance of, and for the non-action in accordance with this great discovery, was the fact that no one knew the *reason why* residence on or near low, wet soil was a prominent cause of consumption. The assertion and proof that this was a true law, when no one could imagine a reason why, has not led to its acceptance in such a hearty manner as to make it a strong factor in controlling the actions of residents of even New England. So that, although the death-rate from consumption in many parts of New England has steadily declined, it has not declined as fast as a knowledge of such an important general law as that propounded by Dr. Bowditch might have led one to expect; and it is with a feeling of sadness that one knowing this must now read the lines written by Dr. Bowditch over a quarter of a century ago, and which glow with lofty sentiments of manly enthusiasm. Not but that *his* work was well and nobly done, but the sadness comes because mankind is so slow to heed the warnings of its best prophets. Dr. Bowditch said:

> When I revolved in my mind the possibility of this being an exact representation of a great truth, and then thought of the vast influence the thorough knowledge of it must have upon our professional practice, and of the beneficial effects upon public hygiene that would perhaps result, *in future*, from an intelligent obedience to it by the community at large, it was the happiest and most satisfactory moment of my professional life. I remembered that over twenty thousand[11] consumptive patients had died in Massachusetts during the previous five years. I asked myself these questions: Supposing this township represents the various townships of the State, and that they all have their varieties of soil, then if this township's statistics are true, and at least twice as many die in the wet as in the dry districts, may not similar results have occurred and perhaps be still occurring all over the State in which these twenty thousand human beings have been slain? Having arrived at this point, you will not be surprised at my asking, still further, this pregnant question: If our fathers and we had paid greater attention to this law, and we had always resided in dry localities, leaving the lower and moister for the purposes of business, perhaps, during the day, or for agriculture, should we not be saving over one thousand lives annually in Massachusetts, which are now foolishly sacrificed? These questions I then answered but imperfectly, but statistics since received, and of which I shall hereafter give you, I hope, more convincing examples, have only made me, each year, more firm in the conviction of the affirmative of these questions, at least in all their essential elements.[12]

The writer of this article accepts the evidence collated by Dr. Bowditch in Massachusetts, by Dr. Buchanan in England, and by Dr. William Pepper in Pennsylvania. I accept it because it seems convincing, because it has not been controverted, because it is in harmony with the several lines of evidence which I myself have collated, and because I think I know *why* it is true; and one chief object of the preparation of this essay is the hope that the reason why may be made plain, and that thereby the realization by mankind of the grand results aimed at by Dr. Bowditch may be aided.

In order to learn the reason for the truth set forth by Dr. Bowditch, let us first inquire what are the principal meteorological differences between high and dry localities, and low and wet localities.

CLIMATIC CHARACTERISTICS OF LOW AND WET, AND OF HIGH AND DRY LOCALITIES.

Atmospheric Pressure.—It is at once apparent that between "high" and "low" localities there is, of course, the difference in atmospheric pressure; but the difference in atmospheric pressure due to the few feet difference in elevation between the best and the worst localities studied by Dr. Bowditch could not have had great influence.

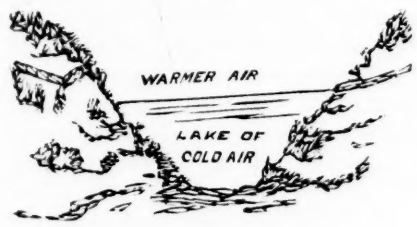
Atmospheric Humidity.—The next most noticeable element is the atmospheric moisture; and here, in my opinion, we strike the point from which our friends, in times past, have almost uniformly diverged from the path which would have led them to the truth. They have assumed, apparently, that a wet *soil* always tends to make a moist *atmosphere* over that soil, and although this is true if we speak only of the *relative* humidity (which is the per cent. of saturation of the air with vapor of water), it is not true if we speak of the *absolute* humidity (which is the amount of vapor of water which the air actually contains). Our predecessors have uniformly considered only the relative humidity, while, as I hope to show, it is mainly the absolute humidity that has influence in the air passages; for the reason that the air exhaled, having been in contact with the warm and moist surfaces in the lungs and air passages, leaves the body, uniformly, summer and winter, at about the same temperature—near 98° F., and nearly saturated with the vapor of water at that temperature. According to Glaisher's and Guyot's tables, air at 98° F., saturated with vapor, contains about 18.69. grs. of vapor in each cubic foot of air. This being so, the quantity of moisture taken out of the lungs and air passages in excess of that inhaled depends, not upon how nearly saturated with vapor the air may be when it is inhaled—not upon its relative humidity, because if saturated at zero it can contain only ½ gr. of vapor, at 32° only 2 grs., at 70° 8 grs., etc.—but the quantity of moisture exhaled in excess of that inhaled mainly depends upon the *absolute* humidity of the atmosphere. If air at zero, saturated with vapor, is inhaled, each cubic foot of it when exhaled will abstract from the lungs and air passages about 18 grs. of vapor of water.[13]

What are the important influences connected

[11] In Registration Report, 1857, we find that during the five years including 1853 to 1857, 23,280 died of consumption in Massachusetts.
[12] Med. Com. Mass. Med. Soc., Vol. vi, Part ii, 1862, pp. 88, 89.

with the excessive exhalation of water from the air passages?

Atmospheric Temperature.—Before answering the foregoing question, however, let us fully understand why it is that residents over a cold *damp soil* are surrounded by an *atmosphere* which is cold and *dry*, absolutely, and which takes *out of the lungs* and air passages *larger* quantities of moisture than does air over a warm and dry soil. The main reason is that the atmosphere over low and wet soil is nearly always cold, as will presently be made apparent. And, as already pointed out, cold air is always, necessarily, dry air, so far as relates to the absolute quantity of moisture; although, because its capacity to hold moisture is slight, and because it has usually been cooled from a higher temperature, in which condition it held more vapor, cold air is frequently saturated with moisture —its *relative* humidity is great, but its *absolute* humidity is small. On the other hand, the atmosphere over high and dry localities is generally warmer, especially when the air is still (as it usually is at night), because then the cold air, being heavier than warm air, settles down into the valleys, and flows along water-courses, while the lighter warm air rises and remains on a higher plane. The sensations of any ordinarily sensitive person are sufficiently acute to detect the cellar-like atmosphere of the valleys and water-courses, on still evenings, when one goes down into them from the higher levels; and the sudden transition from such coolness to noticeable warmth is often very apparent to one who ascends directly from the low levels to a hill top.



A COLD VALLEY.

In speaking of a house in which a case of consumption originated, Dr. Bowditch described the locality as follows:

> On each side of this valley arise high and sandy hills. With each evening sunset, a flood of cold moisture, almost if not quite imperceptible to eyesight, but quite palpable to the sensitive skin of the traveler, settles in between the hills and gradually envelops this devoted house. I have often passed the spot late at night. At times the moon shone clearly on the immediately adjacent ridges, but as I descended from them and passed the house, the rays were obscured, and a chilly feeling came over me, as if taking a cold bath.[14]

While the sun shines, the valleys are frequently warm, and the valleys and low levels are frequently protected from winds, yet, as soon as the sunshine is withdrawn, the general law that warm air is lighter than cold air results in there being *generally* a lake of cold air in all basin-shaped localities, in there being streams of cold air flowing down[15] water-courses, and, generally, in the accumulation of cold air over every locality which is sufficiently basin-shaped that it retains water in or upon the soil. This is one reason why a low, wet place is generally cold. Another reason is that the evaporation of water produces cold, therefore, whenever the atmosphere is not fully saturated with vapor of water, a wet locality is for this reason colder than a dry one. This is one reason why underdraining a soil makes it warmer.

Frosts in Low, Wet Localities.—The fact that low, wet localities are generally cold is of such importance that I do not wish to slur it over, but to present sufficient evidence to make it conclusive. One line of evidence is that of the effect on tender vegetation. The fact that a "killing frost" occurs on low, wet places frequently when the uplands escape, is well known. It is also well known that, in districts where peach trees are grown, peach orchards on the hills frequently escape when those on the low lands are killed by the cold.

Thermometric Observations, on Low Lands.—Experiments made a few years ago by Prof. R. C. Kedzie, at the Michigan Agricultural College, *proved* that self-registering thermometers exposed on the high ground registered a higher temperature, by several degrees, than those exposed on adjacent low grounds; and that the cold air apparently flowed down the natural water-course through the grounds. Comparative observations made by Mr. W. C. Haines, at Lansing, Mich., prove that in a valley, along the bottom of which runs a small stream, a self-registering minimum thermometer (which had been compared with a standard instrument), generally shows the minimum temperature, even in winter months, to be lower than it is on the high ground in the State Capitol Square, in the same city, the difference in the *elevation* being only about 25 feet.

The Atmosphere at Low Levels is Coldest at Night.—The greater cold at low levels is most frequently at night; and it is worthy of note that it is *at a time when artificial heat is not usually employed;* and, although one may be warmly covered in bed, no method has been in very general use for the warming of the air inhaled under such circumstances, so that the lungs and air passages are more influenced by cold nights than by cold days.[16] Observations made for the Royal Meteorological Society of London, England,[17] at Boston, Lincoln-

[13] If air at zero is warmed without being supplied with moisture, and then inhaled, its drying effects on the air passages will, of course, be the same as if breathed at the low temperature.

[14] Med. Com. Mass. Med. Soc., 1862, p. 93.

[15] If the wind is up stream, the flow of cold air may be up stream; but see results of Prof. Kedzie's experiments mentioned further on, under the heading: "Thermometric Observations on Low Lands."

[16] The curve for ozone at *night* in Michigan is almost precisely the same as the curve representing sickness from pneumonia.

[17] Quar. Jour. Royal Met. Soc., October, 1887, p. 275.

shire, 4 feet from the ground, and at 170, and at 260 feet from the ground in the church tower, and which the Secretary of the Society says are "superior to any observations heretofore made," show that—

> The *minimum* temperature at 4 feet is generally colder than at 170 feet, except in winter months, when the latter is generally colder than the former. . . . The mean temperature at 4 feet, during the day hours, is always in excess of that of 260 feet, the difference during the summer months amounting to about 4° at the warmest part of the day. *As night comes on the difference becomes less.*[18]
>
> The general results therefore show that the diurnal range of temperature is much less at the top of the tower and on the belfry than at 4 feet above the ground. . . . .
>
> In foggy weather the temperature at the top of the tower is always warmer than at 4 feet, the upper part of the tower being generally free from fog.[19]

Fogs over Low Lands.—As illustrating the fact that fogs are most frequent over low, wet and cold levels, the remarks by the Secretary of the Royal Meteorological Society are applicable. He says: "The object of the Council in transferring the instruments to Lincoln was to obtain results from a differently situated place. The base of Boston Church was only a few feet above sea level, and the country round was very flat, while Lincoln Cathedral was situated *on a hill and was thus free from the ground fogs which so frequently occurred at Boston.*[20]

It is proper to state that Dr. Bowditch has said:

> While claiming dampness of the *soil* as *one of the prime causes of consumption in New England, I do not assert that it is the sole cause, or that the combination of changeableness and coldness with moisture, may not be vastly more fatal than moisture alone.*[21]

Hillsides are Warmer than Low Levels.—It will be seen by the careful student that Dr. Buchanan carried the investigation, or at least his exact summarizing, further than Dr. Bowditch did; and, although *he* has not taught us what there is about wet, low-lying soils that causes phthisis, he has supplied us with one very important generalization, namely: "There is less phthisis among populations living on sloping impervious soils than among populations living on flat impervious soils.[22] In the light of what has been pointed out in this essay, the reason for this now seems obvious—the sloping impervious soil permits the cold overlying atmosphere to fall into the valleys below, while the flat impervious soil not only retains its own cold atmosphere but tends to send up the slope its warmest air, and to take in exchange the coldest and heaviest atmosphere from the surrounding slopes. Although Dr. Bowditch did not in his summary clearly state the generalization that *sloping* impervious soils are not as dangerous as *flat* impervious soils, portions of his address show that he held it in mind, for he says:

> I believe that all towns, parts of towns, houses even that *rest on* damp, cold soils, are by that very fact liable to the prevalence of consumption. I believe that similar locations *near* wet meadows, rivers, marshes, etc., though less subject to the law, are nevertheless, in a lesser degree, promoters of consumption in the families resident thereupon. Even hills, with clayey subsoil retaining moisture, though not absolutely evil, are less good than a perfectly dry, porous soil, removed from any moisture.[23]

Again, in speaking of choosing a site for a dwelling-house, Dr. Bowditch says:

> It should be in a portion of the township which is neither so high as to be exposed to violent gusts of weather, nor so low that moisture will collect around it. Let it be on the side of a hill, or plain, open to the south, and, if possible, defended from the north and east, on a dry, porous soil, through which water freely percolates, and which, even after a rain, retains little moisture.[24]

SUMMARY: ELEMENTS OF CLIMATE CHARACTERIZING LOW, WET LOCALITIES.

Perhaps this part of the subject has now received sufficient attention to have established the points which it seems important should be understood, namely:

1. That the *atmosphere* over low and wet localities is *cold*, especially *nights* when, because of there frequently being no fires, the lungs and air passages are in most danger of injury, by the inhalation of cold air.

2. That the atmosphere in such localities is, more frequently than at higher levels, saturated with vapor of water, as shown by psychrometric observations, and also by the presence of fogs, etc., and, what is most important—

3. That, because the capacity of cold air to contain vapor of water is very small, the absolute quantity of water contained in the atmosphere in low, wet and cold localities is very small—the atmosphere there is cold and dry, absolutely.

EFFECTS ON LUNGS AND AIR-PASSAGES OF INHALING ATMOSPHERE OF LOW LEVELS.

Therefore, when such air as is usual on low levels is taken into the air-passages and lungs, containing, as it does, only a very few grains of vapor (air at zero containing at most only half a grain to each cubic foot), and is exhaled saturated with moisture at about 98° F. (each cubic foot of air then containing 18.69 grains of water), an excessive quantity of moisture is abstracted from the lungs and air-passages and an excessive quantity of the non-volatile salts of the blood (which pass into the air-cells from the blood with the fluid which normally keeps the air-cells moist), an excessive quantity of these salts is left in the air-cells and on the mucous lining of the air-passages. This is not stated on hypothesis alone, although this conclusion was reached *a priori* from causes known; but it has since been *proved* to be true by reliable and sufficient statistics of sickness and of coincident meteorological conditions, and by chemical analyses of the lungs and

[18] Same page—275. Italics mine.
[19] Quar. Jour. Royal Met. Soc., October, 1887, p. 277.
[20] Same Vol., p. 280. Italics mine.
[21] Med. Com. Mass. Med. Soc., Vol. x, No. 11, 1862, p. 90.
[22] Trans. Am. Climatol. Ass'n, 1886. New York, 1887, p. 90. The original is in paragraph 3, on page 109. Tenth Report of the Medical Officer of the Privy Council, 1867, London, 1868.
[23] Med. Com. Mass. Med. Soc., Vol. x, No. 11, 1862, p. 122.
[24] Page 124.

sputa. Thus, by abundant statistics I have proved[25] (and the evidence with this essay tends strongly to support this view) that at such times as pneumonia, bronchitis, influenza and other diseases of the throat, lungs and air-passages most prevail, the atmosphere is cold and dry (absolutely, although the relative humidity or per cent. of saturation may be great). Dr. Redtenbacher,[26] in 1850, and since him many another person, has shown that during the onward progress of pneumonia chloride of sodium, which is normally present, disappears from the urine. Lionel Smith Beale, M.B., has shown[27] by analyses that the chloride of sodium which, during the onward progress of pneumonia, disappears from the urine, is found in the sputa and in the solidified lung. It is therefore *proved* that just preceding the greatest prevalence of these irritative and exudative diseases of the lungs and air-passages the air inhaled is unusually dry, that the evaporation of moisture and, by inference, the quantity of non-volatile salts left thereby, is unusually great; and that, as proved by analyses, the chlorides are in the sputa and in the solidified lung in unusual proportion; that, notwithstanding the action of the lymphatics, these irritant salts accumulate there. The irritation of influenza, the bronchial cough, the exudation on the surface of the air-passages and sometimes into the air-cells, under such circumstances does not, therefore, seem wonderful. It seems now to be explained. Yet there is still more evidence connecting the presence of sodium chloride in the fluids which moisten the air-passages with the exudation of the albuminous constituents of the blood serum. Experiments by Brücke and afterward by Hoppe[28] have proved that although albumen will not pass through an animal membrane toward pure water, it will pass to a solution of salt; and Hoppe's experiments proved that the passage of the albumen is in proportion to the rapidity of the movement of the fluid.[29]

It would seem, therefore, that the more rapid the evaporation of fluid from the air-passages, and the faster the fluid is exuded toward the unusually strong solution of sodium chloride in the air-cells, the greater the proportion of albumen which will exude into the air-cells. This has an important bearing upon the causation of consumption, because it is quite a common belief, resting upon many observations, that consumption not infrequently follows exposure to taking "cold." Besides, from the work of Prof. R. Koch and others it seems that we must conclude that the introduction into the body of a susceptible person of the *bacillus tuberculosis* is generally followed by tubercular consumption. Therefore, as an albuminous exudate on an irritated or inflamed surface in the air-passages, maintained at the temperature of the human body, supplies a "culture fluid" and temperature conditions which are well known to be favorable to the reproduction of the *bacillus tuberculosis*, it follows that exposure to the inhalation of those bacilli at such times as such an exudate is present in the air-passages must lead to a larger than the average proportion of instances in which such bacilli are enabled to gain a successful lodgment in the air-passages. And since it has been proved that inoculation with the *bacillus tuberculosis* in other parts of the body is not infrequently followed by tuberculosis of the lungs, it seems to follow that the bacilli are caused to exude into the air-passages (brought there from tuberculous foci in other parts of the body); and it would seem that they would be most likely to be exuded, and, if exuded, to maintain a lodgment there at such times as exudation into the air-cells or air-passages is greatest. Therefore, consumption of the lungs should be contracted most readily at such times as croup, influenza, bronchitis and pneumonia occur. Let us examine the evidence of our vital statistics, in order to ascertain whether or not this hypothesis is in accordance with the facts.

DO IRRITATIVE, EXUDATIVE DISEASES OF THE AIR-PASSAGES AND LUNGS ACCOMPANY OR PRECEDE CONSUMPTION?

At the outset we are met with the difficulty that in most States and countries no sufficient statistics of *sickness* are recorded; but inasmuch as the same course of reasoning, as to the favoring of the reproduction of the bacilli in the lungs and air-passages by the occurrence of a saline and albuminous exudate, will apply to the later stages of consumption as well as to the first, it follows that the *deaths* also from consumption should be most frequent following the occurrence of those conditions which cause the exudative diseases of the air-passages.

For the purpose of answering the above question, and to supply the evidence on which this essay is mainly based, twenty-four tables and twenty-four diagrams, accurately drawn to scale and graphically exhibiting the essential facts contained in the tables, are submitted herewith. The first seven tables and diagrams show the relations which the deaths reported from consumption and from each of several diseases in Massachusetts sustain to those from each of the other diseases and to the atmospheric temperature. And since the absolute humidity of the atmosphere is so greatly controlled by the temperature, and the curve for absolute humidity in this part of the world, as shown by a comparison of it in diagram No. 2 with the curve for temperature in diagram No. 1, is almost the same as the curve for tem-

[25] Proceedings Mich. State Board of Health, Oct., 1886, pp. 7–11; Trans. Am. Climat. Assoc., May, 1886, New York, 1887, pp. 226–233; Mich. State Board of Health Report, 1886, pp. 246–324; 1887, pp. 197–211; 1888, pp. 143–169.
[26] Zeitschrift der K. K. Geselschaft der Aertze zu Wien, Aug., 1850.
[27] Trans. Medico-Chirurg. Soc., Vol. xxxv, 1852.
[28] Virchow's Archiv, Vol. 9, 1856, pp. 245–268.
[29] Virchow's Archiv, Vol. 9, 1856, pp. 265–267.

perature, the several diagrams also show, to whomsoever will hold these facts in mind, the relations of the deaths reported from the several diseases to the *absolute humidity* of the atmosphere. For one disease, croup, diagrams 1 and 2 illustrate these relations fully.

In studying the relations of the several diseases it should be borne in mind that the average *duration* is not the same for all; therefore, it cannot be expected that there would be exact uniformity—that the time between the exposure to the cause and the fatal result shall be the same for all diseases. Bearing this in mind, an examination of the several diagrams shows that these diseases sustain such relations to the temperature and absolute humidity of the atmosphere as to indicate that these conditions are causal.

A very noticeable departure from quantitative relations—the same in different parts of the year—is to be seen in the diagrams relative to croup, consumption and diphtheria, and is slightly apparent in the curves relating to small-pox. It is a *lower* curve than proportional in those months when the atmosphere is becoming more warm and moist, and a *higher* curve in those months when the atmosphere is constantly becoming cold and dry. It is as if those who were injured by a very cold dry air do not die if warmer weather ensues, and those taken sick in comparatively warm weather die in unusual proportion in the autumn months, as the weather constantly becomes colder and drier. This is strongly marked in diagram No. 3, relating to consumption. In that diagram, considering the fact of the general relations of the two curves, there are also hints that possibly consumptives guard against exposures more successfully in the coldest months. It is quite possible, and I think probable, that these statistics of deaths from consumption in Massachusetts in recent years are modified by the great numbers of consumptives and persons with susceptible lungs who leave that State in the autumn and do not return from their southern trip until spring. This becomes more apparent when one compares diagram No. 3 with diagrams exhibiting the curves for consumption in some other parts of the world, although the same principles seem to hold, to some extent, in most cases; but in the diagrams of deaths and of *sickness* from consumption in the United States armies during the war of the rebellion it is much less apparent than it is in the diagram (No. 3) relative to deaths in Massachusetts.

Turning now to the more extensive mortality statistics in London, England, it is seen, by a glance at the several diagrams (diagrams 10, 12, 20, 22), that the curves for the diseases of the lungs and air-passages follow the curves for atmospheric temperature with such uniformity as to indicate quantitative causal relations. That the curve for consumption in London (diagram No. 10) does not fall so noticeably as it does in Massachusetts in the winter months, may be, in part, due to the fact that the statistics extend back to a time when journeys southward in the autumn were not so much the custom as at present.

The diagrams show that in London the deaths from consumption do follow, from one to three months later, the deaths from bronchitis and pneumonia.

Tables and diagrams 8, 9 and 23 exhibit the facts respecting the rise and fall of the *sickness* from pneumonia and consumption, and the *deaths* from consumption in the United States armies during the war of the rebellion. The statistics are quite extensive, and as they exhibit the facts relative to the sickness as well as the deaths, they are especially valuable. It will be seen that the sickness and the deaths from consumption do in general follow the sickness from pneumonia; also that the sickness from pneumonia follows the changes of atmospheric temperature with such closeness and regularity as to show that, directly or indirectly, the temperature sustains causal relations.

That the control of diseases of the air-passages by atmospheric temperature is not confined to this country and England, but applies also to countries having very much warmer atmosphere, is proved by the table and diagram No. 14, which show that in India the diseases of the air-passages (not including consumption) are controlled by the temperature.

Finally there are submitted herewith tables and diagrams (Nos. 15 to 21 inclusive) proving that in Michigan (in which State valuable statistics of *sickness* are collected) the *sickness* from nearly every one of the entire class of diseases of the air-passages and lungs is controlled by the atmospheric temperature, and that the sickness from consumption follows, in general, the law which has herein been pointed out.

In all the countries, States, cities and armies concerning which I have thus far studied the statistics relating to this subject, the same law seems to hold: a very considerable proportion of the *sickness* and the *deaths* from consumption follow, or sustain such relations to, the irritative and exudative diseases of the air-passages and lungs as to prove a necessary or causal relation; and these other diseases of the air-passages and lungs are quantitatively related to the temperature and absolute humidity of the atmosphere, proving that, directly or indirectly, they are controlled by these atmospheric conditions. I have pointed out how, in my opinion, this occurs, namely, indirectly through the absolute humidity of the atmosphere, which, so far as its maximum is concerned, is absolutely controlled by the temperature, cold air being always necessarily dry air.

Nor is this all of the evidence. As elsewhere pointed out, it is proved that the deaths from

small-pox follow the same law, as should, theoretically, be the case, because the same remarks, as to the saline and albuminous exudate in the air-passages at the temperature of the body being the best possible "culture fluid" and temperature conditions for the specific cause of consumption, apply as well to the specific cause of small-pox. Therefore, the accompanying tables and diagrams (4 and 22) on this subject are submitted in this connection.

The fact that small-pox and other diseases known to be communicable and to enter the body by way of the air-passages are in great part controlled by the atmospheric temperature, as is shown by diagrams 4, 5, 7, 22 and 24, is, by itself, strong presumptive evidence that such a disease as consumption, a disease in which also the specific cause is believed frequently to enter the body by way of the air-passages, will be controlled by similar atmospheric conditions.

A comparison of diagrams 10 and 22 shows that the curves for deaths from small-pox and consumption in London, England, are almost identical. This must have come about through the inhalation of cold air, which led to irritations and exudations in the air-passages and lungs, and thus favored the contraction of both of these diseases; but, inasmuch as otherwise we would admit that the average duration (of the periods of incubation and of the diseases) was the same in both diseases, it would seem to be proved that the progress of the *later* stages of consumption also is influenced by the irritation and exudations caused by the inhalation of cold air. How this is possible has already been explained.

A LARGE PROPORTION OF THOSE WHO HAVE CONSUMPTION RECOVER.

That there are conditions under which human beings recover from consumption seems to be well proved by many observers. Dr. H. P. Loomis, of New York, is recently reported to have stated that "in no less than 60 per cent. of all patients dying at Bellevue Hospital there were old tubercular changes in the lungs, the disease having been recovered from."[30]

If 13 or 15 per cent. of all deaths are from consumption, and 60 per cent. of those who die of other diseases have had consumption, or at least "tubercular changes in the lungs," from which they have recovered, it would appear that the specific cause gains a lodgment in 73 per cent. of all persons, and proves fatal in only about 13 or 15 per cent. of all persons. This has an important bearing upon the view that the *bacillus tuberculosis* is the only cause which it is worth while to study. A recent writer, speaking of tubercular phthisis, said: "In the autopsies made at the Philadelphia Hospital it is surprising to see the almost universal presence of this disease, in a more or less active state, in patients dying from other affections, such as Bright's disease or carcinoma.[31]

Dr. E. L. Trudeau, of Saranac Lake, N. Y., has said:

> Vibert recently, while making 131 autopsies at the Paris morgue on persons who had come to their death by violence while apparently in good health, noted in twenty-five—that is, in more than nineteen per cent.—the presence of some slight tubercular lesion. In seventeen of the twenty-five a few calcarious and fibrous nodules remained as the only evidence of an unsuspected and arrested tubercular process, but in none were the pathological changes in the lungs extensive. Recovery often follows the operations now undertaken for tubercular peritonitis, though it is evident that all the infectious material cannot be removed.
>
> The records of the autopsies made by Vibert, Councilman and others, as well as the evidence offered by the present research [Dr. Trudeau's experiments on the influence of environment on consumption], furnish proof that the tissues themselves can, under certain conditions, either limit the destructive action of this microbe [*bacillus tuberculosis*], or even entirely rid themselves of its presence.[32]

The experiments by Dr. Trudeau on the influence of environment on the course of tubercular disease artificially induced by the inoculation of animals (published in the "Transactions of the American Climatological Association" for 1887 and 1888) have demonstrated, apparently, that something similar to what has been set forth by Drs. Bowditch and Buchanan as true of the influence of climatic environment on mortality from consumption in the human species, is true relative to animals. Rabits inoculated with the *bacillus tuberculosis* and kept in a cellar-like place on restricted diet, died of the disease in much greater proportion than did similar animals similarly inoculated but kept in the open air with abundance of food. Under such favorable conditions a large proportion of the animals recovered so far, at least, as to maintain good health, although the local infection was not destroyed, but only circumscribed.

THE CAUSATION OF CONSUMPTION IS COMPLEX.

It seems to be difficult for the human mind to grasp more than one idea at a time. Accordingly we find a strong tendency to assume that there is and can be but *one* cause or essential condition leading to consumption; but nothing is more certain than that the forces and reactions in nature are complex, and to me the evidence is conclusive that the causation of consumption is complex. But, although complex, I believe the problem is now quite within our grasp, in all its most important features, if we only hold fast to the truths we have learned of the relations of consumption to low, wet places, while we grasp the obverse idea of the favorable influences of high, dry and sunny places; hold fast to this double image of one great truth, while we lay hold of that one

[30] Jour. Am. Med. Assoc., May 18, 1889, p. 718.
[31] J. H. Musser, M.D., reported in the Medical and Surgical Reporter, Philadelphia, Jan. 26, 1889, p. 102.
[32] Trans. Am. Climatolog. Assoc., 1888, pp. 93–94.

which teaches us the great importance of proper clothing, food and all that goes to make the nourishment of the body fully equal to all demands upon it; hold fast to this rather complex thought while we grasp the great truth which Dr. Robert Koch has given us, that there is a specific cause which *under favoring circumstances and conditions* is an essential factor in the causation of consumption; and, while holding all this in mind, I ask you to consider how it is that this specific cause usually enters the body, and the fact that just as the specific causes of many other diseases (as is proved by the statistics of sickness and deaths which I present to you at this time), just as they enter and cause the disease in proportion to the coldness and dryness of the atmosphere, so the specific cause of consumption apparently and probably finds lodgment in the lungs and air-passages, other things being equal, in proportion to the coldness and dryness of the atmosphere; and not only this, but the danger of auto-infection and of death to one in whose body the disease is already present is increased by exposure in an atmosphere unusually cold and dry, while the condition of the blood is such that saline and albuminous exudates are liable to occur in the air-passages.

Finally, in order to grasp the most at once, we need to link the facts together, realizing the fact that over the low *wet soil* there is generally a *cold, dry atmosphere*, thus making it plain that the facts observed and collated by Drs. Bowditch and Buchanan are entirely in harmony with those observed by Dr. Koch, and with the enormous numbers of facts which I have tabulated, and which prove beyond question that there is a causal relation between the inhalation of such an atmosphere and the occurrence of all the ordinary diseases of the air-passages and of those communicable diseases which enter by way of the air-passages, including tubercular consumption.

ONE RELATION OF STATISTICS OF CONSUMPTION TO STATISTICS OF TEMPERATURE.

By Diagram No. 10, it may be seen that in the City of London during thirty years the fluctuations in the number of deaths from phthisis followed the fluctuations of temperature, nearly as constantly as a shadow, rising and falling, not with but after the temperature changes. In the month of September (following the most favorable temperature in July) the deaths reach the lowest point—an average of 232.4 per week. If the temperature had continued thus favorable throughout the period, it is reasonable to believe that the deaths for each month would have remained the same—an average of 232.4 per week, or 6,884.8 per year, amounting to 206,544 deaths during the period of thirty years. Deducting this number from the number of deaths which really occurred, 231,036, leaves 24,492 as the number of deaths indicated to have been produced by the temperature changes shown in the diagram. Had we records of the temperature, and of the deaths from phthisis for smaller divisions of time, for each day, for instance, it seems to me probable that the fluctuations of temperature would be seen to have sustained a causal relation to a large proportion of the deaths from phthisis, even in the most favorable month. Unfortunately, such perfect records are not available. But the material was originally compiled by weeks, and during the fourth week of September the deaths were only 130, or 2.4 less than the average for that month, apparently responding to a rise of temperature which occurred eight weeks before—the usual difference of time between the fluctuations of temperature and those of the deaths. Substituting this 130 (deaths) for the 132.4 used in the above calculations, gives 28,236 deaths as due to the *weekly* fluctuations of temperature, or 3,744 more than by the *monthly* records. If dividing the unit of comparison (one month) by 4 shows 3,744 more deaths produced by the fluctuations of temperature, what would dividing by 30, or a comparison of observations by days, show? We do not know absolutely; but by analogy we are led to believe that accurate records of the temperature and of the deaths from consumption would show that a large proportion of the *deaths* from phthisis were quantitatively related to atmospheric temperature.

Yet this relation would necessarily be obscured by the greater power possessed by some patients than by others to resist the inroads of consumption. For, on account of the varying duration of the disease, the deaths, instead of always occurring at the same interval after the exposure to the primary cause (cold and contagium), are scattered along according to the virulence of the contagium and the resisting power of the patient, thus grading down the elevations and filling up the depressions in the curve representing deaths from phthisis until it approximates a horizontal line showing only surface fluctuations corresponding with the temperature fluctuations.

The fact that the diseases of the lungs and air passages and the communicable diseases which enter by way of the air passages are later than the exposure to cold by a time equal to the average duration of the disease and the period of incubation, is shown by the diagrams which I present. Thus the maximum sickness from influenza, tonsillitis and croup is in the same month as the greatest exposure to cold, while pneumonia follows one month later, and, according to the most complete statistics, shown in Diagrams 10 and 22, the changes in the deaths from small-pox and consumption follow at a period of about two months after the temperature changes.

I believe that if the average duration of consumption was as uniform as is the average dura-

tion of small-pox, the proportion of the deaths which would be seen to be quantitatively related to the atmospheric temperature would be as great with consumption as with small-pox; and, as may be seen in Diagram No. 22, there were twice as many deaths from small-pox following the coldest season of the year as there were following the warmest season.

THE CAUSATION OF CONSUMPTION—SUMMARY.

In order that mankind shall be able to prevent or avoid the causes of consumption, it seems essential that its causation should be understood. It would seem that we are now in possession of sufficient knowledge of its causation so that, if we will but act upon that knowledge, a large proportion of the sickness and deaths from this most important of all diseases, may be prevented. What are the generalizations which supply the bases for effort for the prevention or avoidance of consumption? They seem to be about as follows:

1. Microscopic organisms called bacilli, of a species known as *bacillus tuberculosis* (Koch), accompany the disease commonly known as consumption.

2. Introduced into a *susceptible* organism, *bacillus tuberculosis* is able to reproduce, and, apparently, to cause and continue the condition known as consumption.

3. These bacilli are present in the sputa of consumptives; and, although outside the body at ordinary low temperatures they do not multiply by reproduction, they are not destroyed by drying, and, consequently, in apartments occupied by consumptives who do not take care to so dispose of the sputa that they shall not become a part of the dust of the room, the dust may contain the bacilli, or their spores. Because so large a proportion of people have consumption, the dust of halls and public places where sputa reach the floors and may become a part of the dust of the room, such dust may contain these bacilli, which are believed to be the *specific* cause of the disease.

4. The bacilli of consumption are introduced into the body in various ways; but, apparently, most frequently by way of the air-passages. (The order of the invasion of the lobes of the lungs is tolerably well understood.)

5. Statistics of sickness, and of deaths, collated with meteorological statistics, seem to prove that the consumptive processes go on most actively after times of low atmospheric temperature, and least actively after times of high atmospheric temperature. It would seem that atmospheric temperature is, directly or indirectly, a *controlling* cause of consumption.

6. Statistics of sickness and of death from consumption, collated with statistics of sickness and deaths from other diseases, prove that, in the long average, consumption is somewhat uniformly preceded in time and place (and inferentially in the same individual, by one of these diseases), by the irritative and exudative diseases of the lungs and air-passages, such diseases as influenza, tonsillitis, croup, bronchitis and pneumonia generally preceding, in the same locality, the occurrence of recognized consumption; they are, apparently, conditions antecedent to consumption.

7. Statistics of sickness and of deaths, collated with meteorological statistics (Seibert, Baker), prove that the irritative and exudative diseases of the lungs and air-passages follow uniformly and quantitatively, in their rise and fall, the fall and rise of the atmospheric temperature, indicating that, directly or indirectly, atmospheric temperature is a *controlling* cause of those diseases.

8. The accumulation of non-volatile salts (chlorides) in the sputa and solidified lung in pneumonia (Beale), coupled with the fact of the disappearance of the chlorides from the urine during the onward progress of pneumonia (Redtenbacher), collated with statistics of sickness, of deaths and of meteorological conditions, and with certain facts in physiology (Brücke and Hoppe), pathology (Stokvis), and chemistry, seem to prove that the control which atmospheric temperature has of pneumonia (and, if of pneumomonia, also its control of all those irritative and exudative diseases of the lungs and air-passages, which it does control), is not direct, but indirect through its well-known control of the atmospheric humidity, and so of the quantity of water exhaled from the lungs and air-passages, influencing the quantity of non-volatile salts which may there accumulate.

9. Residence in low, wet localities tends toward the causation of consumption, and toward the fatality of the disease (Bowditch, Buchanan, Pepper, Trudeau), because in all such localities the atmosphere is cold, and consequently its absolute humidity is small. Other concomitant conditions may contribute — greater atmospheric pressure, greater daily range of pressure, greater daily range of temperature, more active oxidation, less tendency toward deoxidation than occurs under free exposure to sunlight, lack of sufficient nourishing food, etc.

10. Among causes known, or believed, to be *predisposing* to consumption, are: heredity; temperament (certain types of auburn-haired persons being supposed to be especially liable to consumption); narrow lymph-spaces in the connective tissue (Formad),[33] possibly because of their more readily clogging up by saline, albuminous or fibrinous exudations; and excess of such non-volatile salts as sodium chloride in the food or drink.

THE PREVENTION OF CONSUMPTION.

We come now to the most important utilitarian

[33] Jour. of Am. Med. Ass'n, Vol. 2, p. 148.

question connected with this subject,—What can be done to lessen the ravages of this most destructive disease?

It is gratifying to be able to say that, if we accept the evidence collected in this essay, much can be done; and that there is promise of the prevention of a very large proportion of the sickness and of the deaths from consumption, through the adoption of measures which are not difficult, yet which require, for their most speedy and complete accomplishment, such an amount of coöperation by all classes of people as can only be secured through the faithful labors of intelligent boards of health, or of some agency for the thorough dissemination of the truth respecting this disease and the means for its avoidance, restriction, prevention, and climatic and other treatment. It is still true as written in the Bible—"My people are destroyed for lack of knowledge."[34] When once the people know, fully, how and why consumption is caused, they will find and adopt rational methods of protection from that disease.

PREVENTIVE MEASURES.

1. Having in mind the foregoing generalizations, numbered 1, 2, 3, 4, relative to the supposed *specific* cause of consumption, it would seem to be practicable to so enforce, upon the minds of the people generally, the importance of the destruction or the disinfection of all sputa from consumptives, that the present very general distribution[35] of those microörganisms shall be very greatly lessened.

The consumptive might carry small pieces of cloth, each just large enough to properly receive one sputum, and paper envelopes or wrappers in which the cloth may be put as soon as once used, and with its envelope burned on the first opportunity.

2. What has been said about the destruction or disinfection of the sputa of consumptives should apply also to the dejecta; because it has been shown (by Friedländer[36]) that the bacilli are to be found in the urine of persons with tubercular disease of the urinary organs, and in the fæces of those with tubercular disease of the bowels, and they may be in the fæces of those who swallow sputa containing the bacilli, that is, possibly, of any consumptive.

Through better systems of ventilation, much may be done for the lessening the number of microörganisms inhaled with the dust of floors, carpets, etc.; especially by having the foul air exits at the floor-level, so that the general motion of the foul air shall be downwards, and not upwards into the nostrils of the inmates of the room. A more liberal supply of fresh air to all occupied apartments, especially public rooms, would lessen the danger of inhaling air which has already been breathed, and also of microörganisms, etc. So long as the specific cause of consumption is so widespread, lives may probably be saved by the use of respirators by those who sweep and dust rooms which consumptives have occupied.

3. Generalizations Nos. 5 and 7 make it important that consumptives, and persons susceptible to consumption, should especially guard against the inhalation of cold air. It enforces the importance of having such persons spend the winters in a climate warmer than that to which they have been accustomed.

4. Generalization No. 6, in connection with Nos. 1, 2, 3 and 4, teaches us that it is important that every person suffering from one of the irritative or exudative diseases of the lungs or air-passages, should be especially protected from the inhalation of the bacillus tuberculosis.

5. Generalization No. 8 enforces the importance of supplying moisture to all air which requires to be warmed, in hospitals, houses, public buildings, and wherever the temperature of the air can be controlled.

6. Generalizations Nos. 8 and 10 teach us that it may be of very great importance to see that our food and drink, especially in winter, shall not contain an excess of chloride of sodium or other non-volatile salt liable to be exuded into the air-cells or air-passages, and left there by unusual evaporation of vapor through the inhalation of cold air, which is necessarily dry, or of air which has been warmed without the addition of moisture.

6. Generalization No. 9 has been previously commented on, and some of the advice based upon it by Dr. Bowditch has been quoted. But his results have been so well upheld by Drs. Buchanan and Pepper, and by the experiments of Dr. Trudeau, that since we now think we know the reason why residence over low, wet soil endangers health and life from consumption, there should be no hesitation in acting in accordance with the laws laid down by Dr. Bowditch, relative to the avoidance of residence over low, wet soil, and in any cellar-like place.

8. In addition to what is generally known for the prevention of small-pox, diphtheria and scarlet fever, the facts incidentally set forth in this essay teach why it is that the inhalation of cold, dry air is an important factor in the causation of those diseases, and why it is even more important in winter than in summer to guard people from them.

9. Finally, there is given herein evidence as to the causation of a large class of ordinary diseases (of the lungs and air-passages), which should lead to the prevention of a very considerable proportion of the sickness and deaths therefrom.

That there shall be a very thorough dissemi-

[34] Hosea, Chapter IV, verse 6.

[35] Dr. James E. Reeves, ex-Pres. of the Am. Public Health Association, demonstrated the presence of innumerable tubercle bacilli in a sputum on the sidewalk, near the post office in Wheeling, W. Va. They are probably to be found on the sidewalk in every city.

[36] Manual of Microscopical Technology, pp. 219, 236, 237.

nation of the truth, or at least of the nearest approach to the truth that is now known, respecting these subjects which are of vital consequence to every man, woman and child, and that, through the attention to such subjects which shall result from such thorough dissemination, many valuable lives may be saved, and much suffering and sorrow may be prevented, is the earnest wish of the author of this essay.

PELVIC ABSCESS IN THE FEMALE.

Read in the Section of Obstetrics and Diseases of Women at the Fortieth Annual Meeting of the American Medical Association, June, 1889.

BY WILLIAM H. PARISH, M.D.,
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I use this term in its comprehensive and generic sense as indicating the location of pus within the pelvis, and I object to its limitation to pus within the extraperitoneal lamina of areolar tissue. I cannot appreciate the propriety of applying so comprehensive a term as pelvic abscess to an accumulation of pus in the pelvic areolar tissue, inasmuch as modern pathology teaches us that the latter condition is a rare one compared with the formation of pus in other locations within the pelvis. I shall not speak of abscesses within the sheath of the psoas or iliacus muscles, nor of perityphlitic abscess—for these conditions pertain more to general surgery and are common to both sexes. The rarer forms of uterine parenchymatous abscess and of intra-pelvic abscess arising from disease or injury of the pelvic bones I shall also pass by.

I will give three subdivisions of pelvic abscess in the female, namely, areolar abscess; intra-tubal and ovarian abscess; and intra-peritoneal abscess. To one or other of these subdivisions belong the very large majority of intra-pelvic pus formations.

Until recent years pelvic cellulitis was deemed of very frequent occurrence, and consequently abscesses of the pelvic areolar tissue was believed to be by far the most frequent form of abscess within the female pelvis. Modern abdominal surgery has, however, demonstrated the fallacy of such convictions, and it is now known that inflammation of the pelvic areolar tissue or pelvic cellulitis is of only occasional occurrence, and there cannot be a shadow of a doubt that very many cases formerly diagnosticated and treated as abscesses of the pelvic areolar tissue, were accumulations of pus, either within the Fallopian tube, the ovary, or the peritoneal cavity. In fact so much more frequently do the other forms of pelvic abscess occur, that to-day some busy operators would seem almost to doubt the occurrence of pus within the pelvic areolar tissue. But such a conclusion would be equally as erroneous as it was in the past to look upon areolar abscess as the ordinary if not the only form of intrapelvic pus formation.

I have seen a number of areolar abscesses; in some of these cases the location of the pus was demonstrated in an autopsy, in others by a laparotomy and subsequent extra-peritoneal operation, while in still other instances the history and progress of the case justified the diagnosis. This form of abscess is a result of acute areolar inflammation, and is usually a sequel to labor, but may arise because of traumatism of the cervix vagina or external genitals. Doubtless septic infection of the local lymphatics, or more rarely of the veins precedes the abscess. The local septic infection arises from a failure to preserve an aseptic condition of the parturient canal either during or subsequent to labor, or in connection with operations on the external genitals, the vagina or the uterus.

I have never met with an areolar abscess dependent upon extension of gonorrhœal inflammation from the vagina or uterus directly through the walls of those organs into the pelvic areolar tissue. However I am not prepared to deny the possibility of such an occurrence by means of the lymphatics in very rare instances. Suppuration of a pelvic gland may arise as a result of chancroids of the genitals, and a secondary areolar abscess may form, but this must be also of rare occurrence.

Areolar pelvic disease is not infrequently the result of a hæmatoma—the contents then consisting of pus intermixed with degenerated blood elements. Chronic pelvic cellulitis occurs only as a sequel to some of the complications of pelvic abscess. When fistulous tracts persist after the escape of pus into the intestinal canal, or into the bladder or in some other direction; or where degeneration and partial suppuration of a pelvic gland occurs, then pelvic cellulitis becomes chronic. But chronic cellulitis without such complication as a constant cause is a gynecological myth—and has existed only as an *ignis fatuus* in the brains of former members of our profession, or of those of to-day who hug the delusions of the past. The abdominal surgeon has demonstrated in innumerable instances that chronic cellulitis has no independent existence.

Intra-tubal and ovarian abscess frequently coexist. In fact, ovarian abscess when existing, is usually a sequel to and dependent upon tubal disease. They are closely related as to causation, course, prognosis and treatment. I have seen but one instance of an ovarian abscess without an associated pus formation in the tube. In making this statement I do not refer to suppurating ovarian cysts. Bernutz long ago described the disease of the uterine appendages, but it was the abdominal surgeon of recent days who demonstrated the frequency of such diseases and especially the frequency of occurrence of pyosalpynx. That

intratubal abscess occurs with very much greater frequency than areolar abscess, must be apparent to every one familiar with recent abdominal surgery. The enucleation and removal of a distended tube containing several ounces of pus from a mass of adherent viscera and inflammatory exudate with cure of the patient is a convincing argument that the most skeptical have not been able to resist. However there are instances in which the pus accumulation has become so large, and the alteration of the tube wall so great, and its blending with other viscera or tissues so intimate, that it is quite impossible for the operator to determine the starting point of suppuration without an extent of dissection incompatible with the possible safety of the patient.

The obscurity of the origin of such extensive pus formations is rendered greater by the fact that associated with pelvic areolar abscess may also coexist extensive plastic inflammation of the pelvic peritoneum. Upon this obscurity rests in part the difficulty of determining the relative frequency of areolar and tubal abscess. As in past years cases of tubal abscess were unwittingly called areolar abscess so, to-day, it would seem that areolar suppuration with adhesions is liable in some instances to be pronounced intratubal abscess even after the abdomen has been opened.

The term pyosalpynx is indicative of the location of the pus, but it does not convey an idea of the extent of inflammatory exudation and adhesion of viscera in which the pus tube becomes imbedded. After these adhesions have been established the amount of pus that forms in the tube is sometimes very great, amounting in rare instances to several pints. This large mass of inflammatory exudate and of viscera matted together with the enclosed pus accumulation is not properly designated by the term pyosalpynx. It is a form and the most frequent form of pelvic abscess.

Intratubal abscess is dependent in the large majority of cases on an extension of gonorrhœa into the tube. There may not be ascertainable a distinct history of gonorrhœa in the patient, but the confession of the husband usually will throw the necessary light on the causation. He will give a history of chronic gonorrhœa dating back sometimes several years to its acute origin.

The wife in most instances will state that she has not been well since her marriage, several months or several years previous, and she has been suffering with salpingitis and ovaritis prior to the accumulation of pus. This association, in nearly all cases, of pyosalpynx with a history of gonorrhœa would seem to point unmistakably to the causation. The discovery of the gonococcus removes all doubt as to the nature of the cause. In many cases the gonococcus has not been discovered and then only the history of the case can serve us in tracing the process to its origin.

When abscesses do not appear until months after the contraction of the gonorrhœa, there have arisen exciting and contributary causes. Among these may be mentioned exposure to wet and cold during the menstrual period, excessive venery, the introduction into the uterus of that much abused instrument the uterine sound, or of irritant applications or tents, operations on the cervix and as forcible stretching of the cervical canal, and the operation for closure of a lacerated cervix. In the latter operation, independent of sepsis, the too great closure of the canal, and the consequent interference with the proper drainage of the uterus, may constitute the contributary cause of the pyosalpynx. In cases of lingering gonorrhœal salpingitis, it requires but little additional irritation or mechanical disturbance of the uterus or of its appendages to awaken active suppuration within the tube, a leakage of the pus through the fimbriated extremity awakens a local peritonitis; adhesion and deposits of lymphs occur with prevention of further escape of pus, and then, if the uterine extremity becomes occluded by adhesion, an acumulation of pus arises and an intratubal abscess is established. That this form of abscess arises also from extension of septic infection from the uterus, seems generally accepted, but as is well known septic inflammations are not usually plastic in nature, and while septic salpingitis is not rare, yet the conditions are unfavorable for the formation of a tubal abscess, inasmuch as the patulency of the tube is more likely to become increased from relaxation of the tubal and uterine parenchyma than is occlusion of the extremities of the tube from adhesion or exudation. When the septic infection is intense, the patient succumbs in a few days; when it is slight, the patient usually recovers with crippled pelvic viscera, and without the formation of an abscess except in rare instances. After abortion the usual pelvic inflammation is that of septic salpingitis and ovaritis, yet my observations lead me to believe that intratubal abscess, dependent upon an abortion, is of infrequent occurrence. Still it occurs probably with greater frequency after abortion than does areolar abscess. The latter occurs more frequently than the intratubal variety, after labor at or near the full period. The frequent laceration of the cervix and vaginal vault during the latter labors opens the gateway to the infection of the lymphatics leading into the areolar tissue. In abortion the infection begins within the uterine cavity and the tube soon becomes involved.

If the cervix has suffered, as it may in criminal abortion, areolar abscess may arise, or in even non-criminal cases the uterine lymphatics may carry the infection directly into the connective tissue. In early pregnancy, however, the uterine lymphatics are not active, and infection travels then most rapidly among the tubes.

Of course septic salpingitis with possible subsequent abscesses may arise from the introduction of the dangerous uterine sound, or of the very rarely indicated and exceedingly dangerous uterine tent, or from operations on the cervix, vagina or the external genitals when a sepsis has not been preserved. It is to be remembered also that intratubal abscess occasionally develops in connection with tubercular and carcinomatous disease of the uterine appendages.

The successful treatment of pelvic abscess often demands an exercise of the most deliberate judgment and the highest operative skill. It is true that a considerable number of areolar abscesses result in cure by a spontaneous escape of the pus, chiefly into the vagina or into the rectum. But the frequency with which permanent fistulæ follow spontaneous evacuation is sufficiently great to render it unwarrantable to wait for such an event. The undoubted indication is to establish perfect drainage through either the vagina or the abdominal wall as soon as safely practicable. Perfect drainage will alone meet the surgical indication in such an abscess, but is it possible always to determine whether or not the pus is in the areolar tissue? Having the constitutional symptoms of an abscess, the location of the induration or of fluctuation may aid in the diagnosis. That is, the patient having constitutional evidence of suppuration, should fluctuation or induration exist in front of the bladder or in the iliac fossa, and not be present in the locality of the tubes and ovaries, an areolar abscess probably exists.

Again, in some rare instances the direction taken by the accumulating pus may aid in the diagnosis. I have diagnosticated pus in the areolar tissue by finding that the advancing swelling was extending upwards out of the pelvis, in a postero-lateral direction, *i. e.*, toward the kidneys following the abundant layer of connective tissue in that region. When the increase in size of the swelling is rapid, the probabilities are that the inflammatory process is in the areolar tissue. A prominence, or fluctuation to be detected in the vagina, does not throw light on the location of the pus unless it be in front of the bladder. When the origin and the progress of the case justifies the belief that pus has formed in the areolar tissue, an extraperitoneal incision is called for. I do not practice aspiration of a pelvic abscess of any variety as a remedial or curative measure. I dislike very much to resort to it for diagnostic purposes. It often leads to extension and aggravation of the inflammatory action. I would say that aspiration is very rarely justifiable.

In areolar abscess if there is bulging in the vagina, an opening should be made at that point. In opening through the vagina the median line posteriorly must be the elective point as laterally and anteriorly there is danger of wounding either the uterine artery, the urethra or the bladder. It is better to avoid the knife at least after passing through the mucous membrane. Thomas makes an incision through this membrane, then works the index finger through the deeper tissues until the pus cavity is reached. I have repeatedly, after making an incision through the mucous membrane, pushed into the abscess a blunt grooved director and dilated the opening by passing along the groove a strong pair of closed forceps, separating the blades on their withdrawal, after the manner of opening deep seated abscesses recommended by Mr. Hilton.

I have also found the plan practiced by Goodell an excellent one, namely to thrust a closed pair of scissors, not too pointed, and on withdrawing them to separate the blades. If the finger is introduced it will be found that when the pus is in the areolar tissue, there is, after its escape, considerable, if not complete, collapse of the abscess walls, and their inner surfaces are fibrillated, but if an intratubal abscess has been opened the interior will be smooth and there is less tendency for the walls to approach each other, the latter being prevented by reason of the dense peritubal adhesions. If the opening secured is sufficiently large, I syringe out gently the cavity with a solution of corrosive sublimate, one part to three thousand, and introduce a rubber drainage tube.

I have never opened into an abscess through the rectum. While it is true that many cases opening spontaneously *per rectum* recover promptly, yet always there is great danger that gas or fæcal matter will escape into the abscess cavity and establish a permanent fistulous tract. Even if the pus seems quite ready to escape into the rectum, I prefer to open through the vagina.

In many cases the suppuration begins in the areolar tissue so high up in the true or the false pelvis that an opening *per vaginam* is unsafe. Then an incision can be made through the abdominal walls, and usually with the most satisfactory result. The most favorable point in many instances will be above Poupart's ligament, along either its inner or its outer half, not extending the incision so as to endanger the deep epigastric artery, or the iliac vessels. The incision should be made early and carried, it may be, deep into the pelvis, until pus is reached, taking care to keep external to the peritoneum. An early incision can be made at this point and is peculiarly advantageous, for thus can be avoided the establishment of fistulous tracts and the serious crippling of the pelvic organs.

After irrigating the cavity I introduce preferably a large perforated rubber drainage tube. A few instances of perforation of the iliac artery, from ulceration caused by the tube have been reported. Even when the rubber tube is employed, one must remember that the large vessels are imbedded in the areolar tissue and the tube may

come in direct contact with them, unless special care is taken to prevent it.

When the abscess is of the intratubal variety drainage is not so safely secured, nor can a cure be expected from it. The early removal of the appendages after a median abdominal section is the only rational and reliable procedure. The most careful toilet of the peritoneum must be effected and in most instances the drainage tube is necessitated. Usually if the case is seen early the diagnosis is easy, yet in some cases the diagnosis is exceedingly difficult and may not be possible until after the abdomen has been opened.

In arriving at a diagnosis one is aided by a history of gonorrhœa in the husband, of dyspareunia on the part of the woman, and of recurring attacks of pelvic inflammation. The uterus is immobile and a mass rarely fluctuating is felt *per vaginam* to the side of or posterior to the uterus. In cases where suppuration has existed for several days or weeks an indurated mass as large as the closed fist, or larger, rises to the brim of the pelvis, or higher. Usually by this time involvement of the opposite side has occurred. The abscess increases in size less rapidly than the areolar variety and the pelvic viscera are immovably matted together. An incision in the linea alba is indicated and the surgical procedure frequently is of the most difficult and delicate character. Mr. Tait has taught the surgical world a most valuable lesson as to the manner of dealing with such abscesses and among us Drs. Joseph Price, W. G. Wylie and others have achieved results in this direction of which modern surgery may well be proud.

I shall not enter into the details of the operation of removal of a pyosalpynx from its abnormal and intricate environment. I have preferred in this paper to consider the principles involved rather than the surgical technique in detail. While removal of the appendages is the only rational surgical proceedure, there are still cases so long neglected and in which the complications are so grave and extensive and the patient is so exhausted that the immediate removal of the appendages would be attended with the greatest danger; and in a number of instances has eventuated fatally. In such neglected cases it may be the part of wisdom first to secure drainage through the vagina or the abdominal wall and to improve the general and local condition of the patient before attempting the radical operation. After drainage has been secured the adhesions and lymph deposits become absorbed to some extent and the patient regains her strength in part. Then the removal of the appendages can be effected with relative safety. Doubtless in some instances drainage alone has effected a cure in intratubal abscess. Prof. Reamy reported such a case at the last meeting of the American Gynecological Society; but such a result cannot be expected and will prove very exceptional.

In the attempt at drainage it must be remembered that intratubal abscesses are usually double—one in each tube—or even in the same tube there may exist two or more abscesses and the drainage may empty but one, Recurrence is the rule when merely drainage of the intratubal abscess has been attempted. Also inasmuch as, owing to adhesions, the walls of an intratubal abscess do not rapidly collapse, atmospheric air is drawn into the cavity during drainage and septic germs are peculiarly liable to enter.

In cases of doubt as to the location of the pus, exploratory laparotomy may be indicated, and if the pus is in the areolar tissue, a second and extraperitoneal incision is much better than to empty the abscess through the peritoneal cavity, and to stitch the abscess wall to the parietal wall as has been practiced by Mr. Tait. In a large number of pelvic abscesses on which I have operated I have seen but one in which such a procedure was the best one, and that single instance was an intratubal abscess of large size.

Even in the latter form of abscess the pus may sometimes be drained off as a palliative measure by an incision made, it may be made after a median section.

With two fingers in the peritoneal cavity, not only can the appendages and the pelvic cavity be explored, but one is greatly aided in locating the pus when it is in the areolar tissue, and in effecting safely an opening at the most favorable point.

The intraperitoneal variety of pelvic abscess is where the pus is within the pelvic peritoneal cavity and is not of frequent occurrence. It is an error in nomenclature to designate an intratubal abscess as an intraperitoneal abscess. An abscess actually within the peritoneal cavity is not of frequent occurrence. Yet we find it a result of inflammation following the leakage of a gonorrhœal tube, or of a septic tube as after delivery, or it may follow some surgical procedure about the genitals. Again it may arise from extension of inflammation along the lymphatics communicating with the peritoneum, or it may be the result of a foreign body such as a ligature left in the pelvic cavity. When the ligature is the cause of the abscess it is either because it was unclean when introduced or was to much disturbed by the drainage tube, or it was too large, or was in close proximity to the rectum whence septic germs had migrated through the tissues. It is a difficult matter to differentiate this variety of abscess. We must be assisted largely by the history of the case. Laparotomy, evacuation of the pus and removal, if practicable, of the exciting cause are usually the indications, or in case of a ligature it may be fished out through the fistulous tract or it may escape spontaneously. The accumulation of pus within the peritoneum may be very large, the mass reaching as high as the diphragm and displacing the viscera in vari-

ous directions. In one case I removed through a median incision two gallons of pus, with recovery of the patient.

I cannot close this paper without urging the necessity of operating early in every variety of curable pelvic abscess.

The besetting sin of the family practitioner and of the timid and doubting operator is to wait. In this delay the dangers become cumulative, and the surgeon is asked to operate when the case is hopeless. If the patient dies, the general practitioner often is discouraged and in his next case, he waits still longer under the hope that pus may not form or that it may escape spontaneously. He has seen some instances in which he believed suppuration had occurred and yet resolution took place, and he has seen other instances in which after spontaneous evacuation recovery was rapid. So he justifies his delay and gynecology receives the unmerited obloquy attendant upon fatal results inasmuch as the conditions under which an operation is performed are rarely considered by the public or by the profession.

The formation of permanent fistulæ is usually an evidence of the lack of skill or courage on the part of the physician. The fistulous tracts constitute, it may be, indelible evidences of cowardice and inefficiency on the part of the medical attendant. Early surgical interference with the knife should be the inflexible rule in the treatment of all varieties of pelvic abscess.

MENTHOL IN LARYNGEAL PHTHISIS.

Read in the Section of Laryngology and Otology at the Fortieth Annual Meeting of the American Medical Association, held at Newport, June, 1889.

BY CHARLES H. KNIGHT, M.D.,

OF NEW YORK CITY.

But few diseases appeal more keenly to our sympathy than laryngeal phthisis. Extreme pain in swallowing, racking cough and stridulous breathing combine with other symptoms so well known to form a most distressing spectacle. A glance at the long list of medicines and measures which have been, at various times, advocated in its treatment proves the earnestness of the search for a remedy. Experiments with new drugs and new methods have been eagerly undertaken and hopelessly abandoned, until at last the majority of practitioners have settled down to the conclusion that palliative agents are the only resource.

Of recent contributions lactic acid and menthol have, perhaps, attracted the most attention, in part because of the extraordinary claims made in their behalf. If the statements of Rosenberg,[1] the most ardent champion of menthol, are to be accepted, we have in that drug almost a specific in laryngeal phthisis. His views have been more or less corroborated by von Brunn, Beehag[2] and others. In nine out of fifty-seven cases treated by Rosenberg laryngeal ulcers healed, infiltration subsided and subjective symptoms disappeared in from one to four months. In all the cases in which the treatment was persevered with, twenty in number, there was marked improvement. His first successes have been confirmed in more recent cases, the total number now reaching nearly one hundred. Compared with lactic acid, the action of menthol is said to be slower but less painful. He claims to have demonstrated diminution, and, in some cases, disappearance of bacilli. He strongly insists upon the analgesic effect, and especially upon the antiparasitic properties of menthol. On the other hand, Fürbringer emphatically denies its germicidal power, at least so far as the bronchi and pulmonary tissues are concerned. Von Brunn[3] finds that menthol gives better results in patients of delicate habit and in those of nervous, irritable temperament; yet, even in the absence of laryngeal stenosis, and in spite of his success with lactic acid and menthol, he favors tracheotomy, with the idea of giving the larynx immunity from irritation and of preventing aspiration into the bronchi and lungs of laryngeal secretions laden with bacilli. In taking this position he might fairly be suspected of lack of confidence in local applications.

Menthol has been employed in the larynx in several ways. An apparatus has been devised by Dr. Howard Smith[4] especially for spraying hot vaseline in conjunction with menthol, iodoform, or oil of eucalyptus. He uses the spray through the nostrils, and lays unnecessary stress upon the importance of having the fluid *hot*. At first I used it dissolved in olive oil, as suggested by Rosenberg. Lately a solution in fluid albolene, in the proportion of a drachm or a drachm and a half to the ounce, has been found more agreeable. Even with the weaker solution a good deal of irritation and cough is sometimes excited, while some cases bear the stronger solution without much complaint. Patients were directed to inhale ten or twelve drops of the solution from the surface of steaming hot water, or a few drops were thrown over the ulcerated surface with a laryngeal spray or syringe, or the application was made directly with a pledget of cotton. The easiest and perhaps the most effective way was found to be by inhalation for a few minutes every half hour from a nebulizer or vaporizer. The medicated vapor no doubt reaches the bronchi as well as the larynx, and is probably deposited on the mucous membrane of the entire air tract, provided the patient is directed to hold the breath for a few moments after taking an inspiration.

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[1] Therap. Monatshefte, H. 7 and 8, 1888; also, Deutsche Med Wochnschr., 1887, p. 338.
[2] Edinb. Med. Journ., Jan., 1888, p. 625.
[3] Deutsche Med. Wochnschr., 1887, p. 404.
[4] Journ. Am. Med. Ass'n, Sept. 22, 1888, p. 410.

In every case of application with the syringe or brush, cocaine in 10 per cent. solution was first sprayed into the larynx. In only a very small proportion of cases was menthol the sole reliance. Cod liver oil, the hypophosphites, arsenic and iron were used according to indications. In several cases of extensive ulceration and of perichondritis cocaine was sprayed into the fauces to facilitate deglutition, and in some cases morphine was resorted to for the relief of cough. I have never used menthol internally. Rosenberg himself admits that no effect upon the bacilli was seen to follow its internal use, although appetite improved and secretion diminished.

My observations, which have been purely clinical, cover a series of twenty cases treated with menthol in the last two years. No note has been made of the presence of the tubercle bacillus. The diagnosis in each case rested solely on the gross appearance of the laryngeal lesion, confirmed by general symptoms and the existence of well-marked pulmonary disease. Five of these cases were watched to a fatal issue and six are still under observation. In four there was at the outset no laryngeal ulceration. Six were females. The ages ranged from 21 to 39 years. In two cases there was a family history of cancer, and in only three was there a distinct history of death in the immediate family from phthisis. Brief notes of the history of a single case may be of interest as illustrating the results with lactic acid and with menthol.

The patient was an elevated railroad conductor, 37 years old, whose mother died at middle life with some chronic pulmonary disease, probably phthisis, and whose younger brother undoubtedly has pulmonary phthisis. He first came to me for treatment in December, 1886, complaining of the usual symptoms of tuberculosis. He had the appearance and gave the history of a tubercular subject. He had a small cavity at his left apex and a patch of consolidation at his right apex. The larynx presented the characteristics of tuberculosis and an ulcer occupied the posterior commissure, whence it invaded to a slight extent the posterior extremity of the left ventricular band. The vocal bands were intact but very hyperæmic and much impeded in their movements. Lactic acid in 50 per cent. solution was applied on a laryngeal probe tipped with absorbent cotton. Six applications were made at intervals of a week and marked improvement in all respects ensued, the patient at the same time taking cod liver oil and the hypophosphites. Five months later two more applications of the pure acid were made. The patient then went to live in the country for the summer. In September, 1887, he came to me, saying that he felt so well that he intended to resume his occupation. The laryngeal ulcer had apparently healed, with some loss of tissue, but the arytenoids were still somewhat swollen and the larynx was highly congested. There had been no marked change in the condition of the lungs, but the general condition was certainly much better. In spite of my warnings he did attempt to work, and I did not see him again until March, 1888, when he presented himself in a most pitiable condition. All his subjective symptoms were much aggravated. The pulmonary lesion had considerably extended, there had been great loss of flesh, he was hardly able to walk, and could not speak above a whisper. On looking at the larynx it seemed as though no part of its posterior wall were free from ulceration. The arytenoids were enormously swollen and œdematous, and the vocal bands, which were exposed by deep ulceration of the ventricular bands, were thickened, eroded and almost immovable. Under the circumstances it did not seem justifiable to resort to lactic acid, and he was therefore put upon menthol inhalations combined with general tonic and stimulating treatment. His recuperative power was surprising, and for several weeks he seemed to make headway. The laryngeal ulcer became cleaner, the secretion was less abundant and more easily expelled, his appetite improved, although swallowing had to be made easy by the habitual use of cocaine, and signs of better nutrition were evident. Toward the end of summer, however, he again began to fail, although his larynx remained about the same. He began to have extreme odynphagia, which neither morphine nor cocaine would relieve. The prone position in taking fluids, as suggested by Wolfenden, was tried without success. The pain in swallowing finally became so great that he could not eat, and death occurred in November, 1888. This case seems to be especially instructive. In the beginning of treatment the lung affection was so limited and the general condition was so good that spontaneous healing of the laryngeal ulceration might have taken place under tonics and good hygiene. Probably the lactic acid applications hastened the reparative process. When the use of menthol was instituted all the conditions were extremely unfavorable; yet the laryngeal lesion, for a time, assumed a healthier aspect, and there was temporary amelioration of all the subjective symptoms.

There is no question whatever that tubercular ulcers of the larynx may cicatrize[5] under proper treatment and conditions; but it cannot be maintained that tuberculosis is thus cured. We may admit that tuberculosis begins as a local disease, and that primary laryngeal tuberculosis is possible.[6] In such case healing of the laryngeal lesion means prevention of general tuberculosis. When infection of the system has already taken place

[5] See article by Sokolowski, of Warsaw, In Wiener Klin. Wochnschr., Jan. 24, 1889, p. 66.

[6] See paper by Dr. John Sezdiak in the Journal of Laryngology and Rhinology, June, 1889.

the cure of an ulcer of the larynx merely relieves an harassing symptom, and that, unfortunately, only for a time, since it is a clinical fact that the cicatrices of laryngeal ulcers in tubercular subjects are prone to break down and the ulcerative process again becomes active. In menthol we seem to have a drug which has a peculiar sedative effect in tubercular laryngitis. To most patients it is soothing and grateful. Under its influence hyperæmia is diminished and secretion is lessened. In some cases cough and dysphagia are relieved. It may encourage a tendency to cicatrization, which is now and then witnessed in tubercular ulcers of the larynx even without special treatment. It is not unusual to observe displacement of a sloughy surface by apparently healthy granulations, and an attempt at repair begins. I have not seen a well defined tubercular ulcer of the larynx completely heal under its use, although, in many instances, superficial erosions, "catarrhal ulcers,"[7] perhaps due to irritation from cough and perverted secretion, have disappeared.

In conclusion, it would seem that we are not yet forced to adopt the discouraging opinion held by Massei[8], of Naples, that "we are still in want of some remedy or remedies to effect the cure of laryngeal phthisis." The beneficial effects of menthol are obvious, and in propitious cases a cure is feasible; yet the extreme claims of its warmest defenders should be accepted with some reservation. Three points suggest themselves for our consideration:

1. Spontaneous cure of a tubercular ulcer of the larynx may occur.

2. A simple erosion or ulceration may be mistaken for a tubercular ulcer.

3. The best results from local treatment of the larynx may be expected in cases of incipient or limited pulmonary disease, and in primary laryngeal tuberculosis.

No. 20 W. Thirty-first street.

THE CLINIC.

SURGICAL CLINIC AT THE HARLEM HOSPITAL, NEW YORK, DECEMBER 13, 1889.

BY THOMAS H. MANLEY, A.M., M.D.,
OF NEW YORK.
[Reported for THE JOURNAL.]

Gentlemen:—The first case presented for operation is one of strangulated inguinal hernia. The patient, a young man of 24 years, gives a history of having first noticed a swelling on the left side when he was 6 or 7 years old. He wore a truss thereafter almost continuously, until two years ago, when he found that, after leaving it aside, the hernia did not reappear.

The features in the clinical history to which we wish to particularly direct attention are, first, the origin of the trouble. The patient was only cognizant of the existence of the hernia when he was 7 years old. The protrusion may not, indeed, have attained sufficient volume to attract notice till this age, but it is pretty certain that the lesion was of congenital origin, as are the vast majority of all herniæ.

Next, the patient, supposing himself cured, discarded the truss for two years, and it was only when he made a severe strain, that he found his rupture returning. Now for the first time we find that, after many patient and persevering efforts, the patient cannot return the hernia.

It came down at about 3 in the afternoon. At 5 P.M. a local practitioner was called, who also failed to reduce it. Constitutional symptoms having developed, the patient was advised to seek admission to hospital. The great pain at the seat of the protrusion, which is very large, with the constant vomiting, and great exhaustion, all point to strangulation. In the treatment of this case we have two objects in view. The first and most important one is to release the obstruction, cut down and divide the constricting band, wherever it may be located; and then go on, and complete an operation which has for its object the radical cure of the hernia.

And here, we must notice the defective structural development, the deranged and confused anatomical position of the parts, before we can decide on the precise surgical measures which may prove most efficient in securing a cure.

Does the fœtal type still persist?

Is there an undescended testis, or one lying somewhere along the inguinal canal; or, if it has descended from this position, has it contracted adhesions with the floating viscera of the abdomen, and carried a portion of them to the base of the scrotum?

Is the fault due to a lavish, a morbid supply of omentum, or an abnormally long mesenteric ligament?

The operation is begun by the long, free incision. In going down deeply, it is at once manifest that it is a case of the congenital variety. We find no true sac; the immense mass of extruded omentum lies in snug apposition with the tunica albuginea, of the testis, but not adherent to it.

Finding the condition of things unfavorable, we shall not be able to do the classic operation of McBurney, which we have hitherto performed with most gratifying results in strangulated hernia.

We shall make a sort of modified McEwen operation, what might be designated perhaps as a "McBurney–McEwen operation;" *i. e.*, hav-

[7] See Gouguenheim and Tissier, "Phthisie Laryngée," Paris, 1889.
[8] The Journal of Laryngology and Rhinology, vol. i, 1887, p. 164.

ing no sac to ligate, without sacrificing the testes, we shall be obliged to protect the one remaining—really the sheath of the spermatic cord—and at the same time fill in, and obliterate, the greatly enlarged space between the pillars of the ring. In order to do this, after ligating and cutting away the superfluous omentum, we fix the remaining stalk in the canal with the quilled suture, after the plan of McEwen, while the remainder of the operation is completed after the plan of McBurney. The cutaneous surfaces of the wound are sewed down to the peritoneum, and the whole treated by the open method.

The second case for operation is another hernia.

The patient, a boy of 7, has had this hernia (left) since birth. His father had him carried to divers traveling charlatans during the first few years of his life, but latterly has consulted with several well known surgeons regarding him. There has been a great difference of opinion as to what the swelling really was, and the plan of treatment; some maintaining that it was a hydrocele, or an encysted spermatocele, etc.; some recommended operation, and others frowned at the very idea of it.

There are a few points unmistakably clear, in connection with this case.

The first; that there was a protrusion, that went on increasing with the boy's growth, and that it could not be reduced. Further, it is growing so rapidly and becoming so prominent under the trousers, as to attract notice, and hence is bringing down on the lad the jeers and banter of other boys, so that the little fellow, himself, is anxious to get rid of it.

Thorough antisepsis being maintained, the operation is commenced by making the usual long, free incision over the line of the spermatic cord, from the internal ring downwards. Here, as in the preceding case, there is no sac; and we proceed to freely lay open the tunica vaginalis which invests the protruded mass, and cannot be sent back to the abdomen by ordinary taxis. The enlargement consisted of nearly 12 inches of intestine. We find on careful examination, that the reason the gut failed to return was not resistance from above, but because, on its mesenteric border, the vas deferens, the epididymis and testis are in one confused mass, all bound rigidly to the intestine by well organized fibrous tissue, which must be divided with the scissors.

After thoroughly freeing the bowel, the atrophied testis is removed, high up, the gut itself returned, and the peritoneal cavity closed by ligating the fascia propria, on a level with the internal ring. The wound is to be treated by the open plan.

We next exhibit a man of 73 years, on whom we operated successfully two months ago. The man had a large incarcerated hernia on each side, which he said had annoyed him for more than forty years. At first they were readily reducible, but owing to badly fitting trusses, a localized peritonitis developed, which ended in the firm adhesion of the sac with its contents, and the production of the condition which is usually observed after a sufficient lapse of time, *i. e.*, an incarcerated hernia.

The great difference in age should be noted in these two cases; but neither extreme constitutes an obstacle to operative measures, when the patient is in sound health; indeed, in congenital hernia we would advise the operation at the earliest possible date, preferably before the infant is a month old.

P. S. Both cases made excellent recoveries, and were dismissed from the hospital, cured, six weeks later.

MEDICAL PROGRESS.

PATHOGENIC PROPERTIES OF MICROBES IN THE INTERIOR OF MALIGNANT TUMORS.—PROF. A. VERNEUIL (*Rev. de Chir.*), after a long and careful study of the pathogenic properties of microbes found within malignant tumors, concludes that they modify the nutrition of neoplasms, accelerate their growth, render cell proliferation more active, and are notably the chief agents of ulceration and softening, the exact causes of which still remain obscure; that they possess special pathogenic properties, by virtue of which they affect the ecomomy in some cases like septic poisons. Prof. Verneuil summarizes his further observations as follows:

1. The tissue of malignant neoplasm (cancers sarcomata epitheliomata, etc.) may be invaded at a given time by various microbes whose origin, character and numbers cannot be definitely ascertained.

2. This invasion, the causes and mechanism of which are equally unknown, may remain latent for a longer or shorter time; but in some cases it may also lead to various modifications in the evolution and nutrition of tumors, among others to rapid growth, softening and ulceration.

3. Microbes are not found in all kinds of neoplasms, nor in all neoplasms of the same kind, nor even in all parts of a single neoplasm that has been invaded. They are not found, for example, in lipomata, pure fibromata, sarcomata, or commencing cancers of slow growth, in an unformed condition and covered by healthy skin; on the contrary, they are found almost constantly in softened and ulcerated neoplasms.

4. These microbes, besides the irritating and inflammatory action which they exercise locally upon the tissue of the tumor invaded, possess other pathogenic properties of importance to the entire ecomomy. Furthermore, in all probability

they are capable of lighting up a more or less intense and irregular fever while they are still enclosed in a tumor which is in the process of rapid growth or softening. Again, during the removal of a tumor containing them they may be mixed with the fluids of the softened parts of the tumor, and thus, spreading upon the field of operation, they may contaminate it, infect it, and inoculate it in such manner as to provoke the development of a dangerous septic fever.

5. Recognition of this last fact argues in favor of the early removal of malignant neoplasms, so desirable from every point of view, and points out to surgeons certain preventive measures to be observed during and after the extirpation of tumors infected by microbes.

TREATMENT OF DIPHTHERIA.—DR. A. TURILAZZI (reported in *Wiener Med. Woch.*) employs a sublimate solution, for local application in diphtheria, of the following strength:

℞ Sublimate . . . . . 0.30 grm.
Alcoholis conc. . . . . e. s. ad solut. exact.
Adde glycerinæ . . . . . 15.0 ccm.
Filtra per cartam.
S. To be applied with a pencil.

The reporter has never observed the slightest symptom of intolerance of this solution. It is thoroughly applied to all parts covered by the membranes from seven to ten times in succession, the pencil being cleansed each time. The applications are made twice a day in light cases, and from three to four times a day in the severe ones. In this manner the reporter has treated 182 cases of diphtheria, with only nine deaths, while a colleague, at his recommendation, has treated 87 cases, with three deaths. This gives a total mortality of the cases thus treated amounting to only 4.09 per cent. Especially notable in this treatment is the diminution in the duration of the disease, which seldom exceeded eight days, and never fifteen.

THE PREVENTION OF TUBERCULOSIS.—In discussing, at the French Academy of Medicine, the instructions relating to the prevention of tuberculosis which emanated from the Congress of Tuberculosis, M. LEROY DE MÉRICOURT said he feared that the divulgence of the dangers of contagion would terrify the public, and that the unfortunate victims of the disease might therefore be abandoned like lepers; he felt the more alarmed because he was not thoroughly convinced of the dangers of contagion; he was not acquainted with a single clinical case where phthisis had been communicated by contagion; he was unaware of a single case of contamination from meat; he believed that the specific bacilli had not been found in milk, and therefore it was unnecessary that warm milk should be abandoned for the less agreeable and less digestible boiled article, and that rare beefsteak should give way to meats impaired by too prolonged cooking. He believed that it would be impossible to carry out the practical execution of the recommendations contained in the instructions.

M. TRASBOT, like the previous speaker, had never observed the transmission of tuberculosis from animals to man. Tuberculosis, he said, is becoming less and less frequent among cattle, and the cows of the Paris dairies are in excellent condition.

M. NOCARD called the attention of the other speakers to facts proving the contagious character of tuberculosis. But it remained for M. CORNIL to properly dispose of the question. He cited clinical facts demonstrating contagion from man to man; he also reported the importation of the disease from phthisical subjects in countries where it had hitherto been unknown. It was thus that the Fuegans first became affected with tuberculosis, which was brought to Terra del Fuego by a clergyman's family. The wife of the clergyman was a consumptive; she founded a school, and after a time the young Fuegans, her pupils, were decimated by acute phthisis, ; thus their teacher brought them at once the Word of God and the bacillus of Koch. M. Cornil has frequently found the bacillus in milk.

All these facts authorize the declarations contained in the instructions. As for the fear of injuring the sick by revealing the dangers of contact with them, it is entirely illusory. Numerous other diseases are regarded as contagious, but their victims are not left without resource on that account.

As for the rest, the Academy may authorize the publication of the instructions or not, the moral effect will be neither increased nor diminished, the entire press having already made every variety of comment regarding the instructions of the Congress of Tuberculosis.—*La Prov. Méd.*

FIFTY CASES OF CARCINOMA MAMMÆ.—DR. E. BRIAN reports fifty cases of carcinoma mammæ operated on by Prof. Courvoisier. The writer directs attention to the fact that whereas in 1869 Busch was acquainted with only a single case in which there was no return of the disease eight years after the operation, the statistics of recent times show from 4.7 per cent. to 30 per cent. of definite cures. Of Courvoisier's fifty cases all but one occurred in women; if we subtract from these six inoperable cases, three cases in which there was freedom from a return of the disease but death from other causes, three cases in which there was immediate death from the operation, etc., there will remain thirty-five cases of operation with eleven definitive recoveries, in so far as this term may be applied to observations extending over a period of from three and one-half to nine and one-half years. This gives a percentage of recovery amounting to 31.42, or, taking

the fifteen other cases into consideration, 23.9. Such figures forbid the expectant treatment of mammary carcinoma. One case is particularly noteworthy in which, upon the second return of the disease in the axillary glands, the patient was operated upon and has remained healthy for nine years.

The reporter gives the following among the predisposing causes of the disease: Sex; age, the highest percentage being reached at the maturity of womanhood with a maximum at the climacteric; frequent childbearing, lactation, mastitis, local irritation, trauma; hereditary influences (recognized in one-eighth of Courvoisier's cases).

In this series of cases it was observed that mammary cancers in general tend to extend outward toward the surface with ulceration or fixation of the skin before they extend to the subjacent tissues; when they extend in the latter direction immobility of the breast becomes a prominent symptom.

The principles according to which Courvoisier proceeds are as follows:

1. The entire mammary gland must be removed together with a liberal amount of integument.

2. At the slightest suspicion the axilla must be cleared out.

3. When it is necessary to clear out the axilla the operation must be begun in this locality and completed by subsequent removal of the breast. In this wise the severest portion of the operation is first completed and one avoids the danger of double hæmorrhage from the axillary vessels, and at the same time lessens the danger of infection through the lymph channels.

The operator calls attention to the malignancy of carcinoma of the breast in men, and to the loss of two of his patients from septic processes which he attributed to the use of juniper catgut. —*Corres.-Bl. für Sch. Aerzte.*

EXPERIMENTAL INOCULATION OF CANCER IN RATS.—HANAŭ, of Zurich, reports experiments in the inoculation of rats from a cutaneous cancer obtained from a rat. He transplanted small pieces of a vulvar cancer with ganglionic metastasis in the scrotum of old rats. One of these died in seven weeks from a diffused peritoneal cancer; the other was killed at the end of eight weeks and exhibited two cancerous nodules situated in the tail of the epididymus. A small fragment of this was inoculated in a third rat and an autopsy made three months later showed a diffuse cancer of the scrotum, with involvement of the peritoneum. In all these cases the diagnosis of carcinoma was established by careful histological examination, which also demonstrated the corneous character of the cancer.

The reporter ignores the failure of inoculation under the following conditions: Subcutaneous implantation in the place of transplantation upon serous surfaces, traumatic suppuration, and finally the employment of fragments taken from the human subject, or inoculation of animals of different species and very young animals.—*Rev. de Chir.*

TREATMENT OF ŒSOPHAGEAL STRICTURE.—What is the best method of treating stricture of the œsophagus? M. Nicaise advises early gastrostomy for cancerous strictures; M. Kirmisson, the prolonged use of the rubber sound; M. Le Dentu, for cicatricial strictures, internal œsophagotomy with an apparatus with blades of increasing size, analogous to the maisonneure urethrotome. Prof. Le Fort, in his report to the Academy upon these three methods, expresses his preference for progressive dilatation in cicatricial strictures, and the prolonged use of the sound, to gastrostomy, which, according to the statistics of Zesas, has given 111 deaths in 129 cases of cancer.

QUININE AND SULPHUR IN DIPHTHERIA.—DR. JOSEPH BURGHARDT (*Wiener Med. Woch.*) recommends the use of quinine and sulphur by insufflation in the treatment of diphtheria. He uses the sulphur lotum and sulphate of quinia in equal parts. Since using this combination he has treated thirty-three cases of diphtheria occurring in patients of all ages, and the results have left nothing to be desired; whereas, before adopting his present method of treatment, he lost one case in every three or four.

A CURE PRODUCED BY ARSENICAL POISONING.—CARL STADLER reports the case of a child 2½ years old that was severely poisoned by swallowing a rat powder containing arsenic. The child was saved by energetic treatment and in eight days was well again. The remarkable part of the case was that the child, which had been backward in its mental development and at 2 years of age could pronounce only a single word, all at once exhibited marked intellectual improvement, making rapid progress from day to day; furthermore, incontinence of the bladder and bowels which had so far resisted all attempts at a cure suddenly disappeared. Stadler is convinced that the sudden mental improvement is entirely attributable to the beneficent action of the arsenic, and he therefore advises the employment of this remedy in moderate doses in cases where anomalies of brain and nerve function are exhibited and where a nervine is indicated to increase the energy of innervation.—*Wiener Med. Woch.*

THE CHRIST HOSPITAL OF JERSEY CITY.—A new hospital at Jersey City has been dedicated, under the auspices of the Episcopal Church, and will be known as the Christ Hospital of that city.

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ALBUMEN, ITS DECOMPOSITION PRODUCTS, AND THEIR RELATION TO HEALTH AND DISEASE.

In the mineral world, certain fixed and definite laws have been determined governing the splitting up of complex chemical molecules into simpler ones. Similarity of ultimate composition, for example, determining the lines of cleavage in certain crystalline groups; or the simpler molecules resulting from the application of such decomposing influences as heat, pressure, light, or electricity to more complex ones. Again, similarity of chemical constitution determines the physiological action.

So too, in the organic chemical world, we begin to perceive that the same or similar laws govern the changes taking place in the far more complex molecules here met with. True, we are simply on the threshold of a correct knowledge of these far more difficult questions; yet such are the advances already made we may, with the aid of *a priori* reasoning, throw much light on one of the darkest and most difficult questions of physiological and pathological medicine. Which question once answered, will mark an advance, excelling in grandeur (though dependent in part upon it) that which marks the era of exact science of bacteriology. Dependent upon it—because without the stimulus which this induced to explain the action of pathogenic bacteria on the human organism—many of the decomposition products now familiar to us, would have remained hidden in the chemical lumber-room; and the influence of those known long before they were suspected of being of bacterial origin, would have never been studied.

Albumen, usually looked upon as a single complex molecule, is worthy the utmost interest as regards its decomposition products; since it is not simply as albumen *per se*, it is useful to the organism, but as a source of numerous decomposition products of the greatest importance to understand.

In beginning we stated that chemical molecules undergo certain definite decompositions in accord with the influences to which they are subjected: *i. e.*, they possess lines along which decompositions easiest occur; while the very act of splitting, without further chemical change, liberates in some such form as *heat* or *motion* that latent energy which held the molecule intact.

The molecule under consideration, from whatever source it may be derived, fish, flesh, or fowl, gives certain characteristics to its decomposition products, to this extent, that the lines of decomposition are such that at least three distinct series of chemical bodies are formed which have at their respective heads for their simplest homologues:

1. An acid—(HCN) prussic acid.

2. An intermediated aromatic body like (C_6H_5-(OH)) phenol, indol, skatol, and finally,

3. An alkaline or basic body constituted like (NH_3) ammonia.

In brief, an acid series; an alkaline or basic series; and a neutral aromatic series. *Possibly* derived from some of the vegetal albumenoids, we have an example which seems to illustrate to some extent these series in the decomposition of the only well-known *nitrogen-containing* glucoside, amygdalin, thus: (Amygdalin) plus (water) equals (prussic ac.) (oil almonds, am.) (glucose) $C_{20}H_{27}NO_{11}+H_2O=(HCN)+C_7H_5OH+C_6H_{12}O_6$. SEEGEN has shown that glucose may be derived from albumenoids.

So in the few decomposition products of albumen that have already been studied we find the various series appropriately illustrated thus:

Acid Series. — $C_5H_5N_5$ = adenin; $C_5H_5N_5O$ = guanine; $C_5H_4N_4O$ = xanthin $C_5H_4N_4O_2$ = hypoxanthin; $C_5H_4N_4O_3$ = uric acid; and many others illustrating continuous oxidation.

Aromatic Series.—C_6H_5OH = phenol; (1) C_8H_7N = indol; (2) C_8H_7NO = oxindol; C_9H_9N = skatol; (3) $C_8H_7NO_2$ = dioxindol; (4) $C_8H_5NO_2$ = isatin; $C_{25}H_{25}OH$ = cholesterin; (5) $C_{16}H_{10}N_2O$ = indigo; and many more. Significant too, that

many of these are to be found in the vegetable world, probably as leucomaines.

Basic Series.—$C_4H_9N_3O_2$ = creatin; $C_4H_7N_3O$ = creatinin; $C_9H_{19}N_7O_4$ = amphicreatin; also CH_5N = methylamin; C_2H_7N = dimethylamine; C_3H_9N = trimethylamine; $C_5H_{11}N$ = tetanotoxin; $C_5H_{14}N$ = cadaverin; $C_5H_{15}NO_2$ = choline; $C_7H_{17}NO_2$ = typhotoxin.

In order to give a clearer comprehension, definition of certain terms now met with in articles on this subject seems here appropriate.

Alkaloids, whether of animal, vegetable or putrefactive origin, consist of single or compound molecules of ammonia NH_3; $N\left\{\begin{matrix}H\\H\\H\end{matrix}\right.$ in which some of the "H" atoms have been replaced by one or more organic molecules thus:

$$N\left\{\begin{matrix}CH\\H\\H\end{matrix}\right. \text{ and } N\left\{\begin{matrix}CH_3\\CH_3\\CH_3\end{matrix}\right.$$

methylamine and trimethylamine, and having been derived from the volatile alkali "ammonia" they still possess the chemical properties which characterized the parent nucleus, hence are basic, turn litmus blue, and are capable of forming salts with acids, and are volatile. When it happens that there is a molecule of "O" in the radical which replaces the "H" of the ammonia nucleus the resulting alkaloid is *non-volatile*.

When GAUTIER began to investigate the decomposition products of albumenoids in the human economy he found certain alkaloidal bodies always present, and as their source was in albumen, he proposed the term leucomaines, from the Greek root which signifies white of egg. As he began to find that they were not simply confined to the animal economy, but were to be found in the vegetable world also, it became necessary to differentiate and limit the term; so that at present it is used to classify those alkaloids which are found in healthy tissues, and are thought to be formed from the indirect (peptic or pancreatic) or direct action of the differing cellular elements constituting the human organism, while the term "ptomaines" is applied to those resulting from the vital processes of microörganisms and their digestive ferments, it is as easily conceivable that they must secrete such, since their stomach or medium of absorption and digestion is on their exterior, as it is to understand the exudate of pepsin and pancreatin from somewhat larger cellular elements of the stomach or pancreas.

As attention was first called to them by Selmi (recently deceased), who found them complicating his toxicological analyses, Brieger urges that the term be retained to denote those cadaveric alkaloids which are only slightly or non-toxic, while the term "toxines" be applied to those found to be decidedly toxic.

BRIEGER says: "According to the standpoint of the practical physician, based on the broad foundations of a definite physiology, all known diseases are divided into, 1, those of a traumatic origin; 2, infectious; 3, metabolic diseases; and 4, neuroses—the last two of which are experiencing an ever narrowing boundary in favor of the infectious group.

"Bacterial chemistry must take a place in the foreground in the clinical understanding of infectious diseases, since the mechanical spreading, as well as deoxidizing and albumen robbing power of the bacteria is not sufficient explanation of the disease symptoms. As living organisms, the bacteria must seize from their surroundings for the construction of their bodies, then throwing off the utilized material, as effete matter, it remains in their immediate neighborhood or enters the general circulation. These can only rivet the attention through the assistance of exact chemistry."

Out of the chaos of waste products there have been extracted and studied a long list of bodies, phenol, indol, cresol and skatol in the aromatic series, creatin in the basic and uric acid in the acid series serving as mere examples.

Even in the very first change from albumens to peptones we experience an alteration from innocent to toxic bodies, as has been demonstrated by the hypodermic injection of the digestion leucomaine of fibrine by pepsin. This is practically demonstrated too frequently, after the too hearty meal, when it happens that the normal capacity of the liver to store them is exceeded, and they escape into the general circulation, producing their characteristic symptoms of somnolence, lassitude and even stupor. We say escape the liver, for a fortunate provision of nature is that which prevents the too rapid entrance into the blood of ptomaines, toxine and leucomaines by colligating them with the sulphuric radical as Baumann has shown, and when this is exhausted then with glycosuric acid, as Schmiedeberg has demonstrated. Both being functions of the liver, and in both cases they are

converted into non-toxic or insoluble bodies, and therefore innocent. Nor is this only true of the toxines, but similarly true of the medicinal alkaloids like morphia, etc., and explains the cumulative effect in that organ and induces the toxicologist to search there primarily for his poisons.

Certain poisons escape that organ which do not belong to this class (*e. g.* digitalin), and float along to be taken care of by the pancreas, which has been demonstrated to be the organ which takes care of the excess of glucoses with its congeners, while disorders of which organ explains the eccentric form of diabetes. Light here again is thrown on the disposition of the aromatic poisons, which, like phenol, when conjugated with the sulphuric radical, are rendered harmless while still antiseptic, and are excreted through the kidneys in that combination, thus medicating the urine. In like manner other members of that group, indol and skatol, which are always to be found in the waste products of the microörganisms continually present in the intestinal tract, and, as such, are similarly disposed of. Hence, when these fermentations go on to an excessive extent, as in intestinal obstruction, or where the powers of life become impaired, as in diphtheria, scarlet fever or pyæmia, the safeguards, sulphuric and glycosuric acids, are exhausted, and in the urine large amounts of the aromatics appear and form the basis for Rosenbach's test for the benzol derivatives.

Brieger, who deserves the greatest praise for the enormous work he has done in determining the ultimate composition and toxic action of the large majority of all the known toxines and ptomaines, has shown that much of the detrimental action of bacteria is due either to their powers of oxidation or reduction, so that by this means perfectly harmless constituents of the tissues may be converted into deadly toxines, new chemical individualities. In this manner he has extracted from putrefied human, horse or beef tissues, neuridin, cadaverin and putrescin, among the *ptomaines*, and mydato-toxin (an isomer of typhotoxin), also neurin and methylguanidin, among the *toxines*. The last two he has shown to have decidedly toxic action, while nicely illustrating the power of bacteria to convert innocent into dangerous molecules. Neurin can be produced from the common cholin of the body by the abstraction of a molecule of H_2O, and thus a *leucomaine*, poisonous only in immense doses, is by the bacteria changed into the *toxin* that induces death through its paralyzing the posterior extremities, stopping the heart in diastole, as well as developing the other symptoms of the muscarin group, salivation, weeping, pupillary contraction and profuse diarrhœas!

Methylguanidin, on the other hand, demonstrates the oxidation powers of the bacteria, for as source of the intensely toxic convulsive poison we have the comparatively innocent constituent of all animal tissues, *creatin* (Brieger). Simple action of kalium permanganate will convert creatin into methylguanidin in like manner.

Not alone from all this are we to regard as simple foundation stones in the future of medical science, but already very important deductions have been made and utilized. A *fact* (that can be set down as almost an axiom) is that the waste products of microörganisms, as is the case among the macroörganisms, are fatal in the one case as in the other. Further, the excreta of one are also fatal to many other bacteria, the fatality being proportional to the similarity of biological plane. Long before we knew them to be waste products of organisms we utilized our common antiseptics to destroy other or the same organism which had prepared it for us. How instructive is it, then, that phenol, our common microbicide, is the waste product of the bacterium commune coli, as likewise its congeners, indol and scatol, all antiseptics and all derived from albuminoids by the action of germs!

Indigo, belonging to the same group and an antiseptic, is a commercial product of a special ferment and has its admirers in the medical world. Lactic acid (the waste leucomaine of muscle cells), with which we have so far familiarized ourselves that we forget its cellular origin in our utilization of it to destroy the bacillus of green diarrhœa of infants, or add it to our prescription when correcting a fermentative dyspepsia so frequently due to foreign ferments. Nature's safeguard against infection through the alimentary tract we utilize to destroy the dread *B. tuberculosis* in its laryngeal manifestations. Recalling the facts that whenever toxic substances are introduced into the alimentary tract, they are taken care of in one of the following ways:

1. If alkaloids, by conjugation with the "S" biliary acids.

2. If carbohydrates, they escape the liver and are taken care of by the blood and pancreas.

3. If belonging to the class of phenols, they are combined with a sulphuric radical, and when that gives out, are then combined with glycosuric acid and thus rendered innocuous.

We close with the conclusions that:

1. A thorough knowledge of the waste products, or microörganisms, is essential to the clear perception of an infectious disease.

2. That greater utilization should be made of the knowledge that waste products of bacteria are toxic or inhibitive to other than themselves.

3. That normal foods often become toxic through the action of organized ferments.

4. That normal digestion is a continual tidal process of fermentation.

5. That increase of the sulphates is indicated in toxæmia due to excessive fermentation or retention.

6. That to certain toxines the system may become habituated, when a protection is afforded and a rational explanation is offered to protective inoculations, however carried out.

THE PUBLICATION OF PAPERS.

It seems desirable that gentlemen who presented papers at the last annual meeting of the Association should be advised as to the order in which they have been arranged for publication. At the earliest date possible after the meeting the papers from each of the several Sections were numbered and *filed* in the order in which they were there presented.

In making selections for publication it seems a matter of justice that each Section should be represented in frequency according to its number of papers. Thus, if in one Section thirty articles were presented, and in another only ten, three from the first should be published and one from the latter, and that thus no preference would be accorded to any individual Section.

The aim has been to present from three to four articles in each issue of THE JOURNAL, and the only departures from the order indicated have been when in connection with the publication of one very long paper two or three short articles were needed to secure that end. In that manner we are steadily moving on in the presentation of papers, and if those members whose articles have not yet appeared will consult their Section programmes, they will find that the reason lies in the fact that they were late in the presentation of the same in their several Sections.

This much is due to those who so kindly favored the Associations with their communications, and it is also due to the Management which is seeking to act in this matter with utmost impartiality.

PRELIMINARY ARRANGEMENTS.

We are glad to announce that Dr. William B. Atkinson, 1400 Pine St., Philadelphia, as General Secretary of the American Medical Association, is already perfecting arrangements with the principal railroads in the country, whereby special rates of transportation may be secured for members of the Association and such members of their families as may desire to attend the next annual meeting at Nashville.

The Secretary desires, as far as he may, to learn at an early date how many individuals may probably desire to avail themselves of such special rates, and their localities. He therefore invites individual correspondence and will avail himself of the information thus obtained in securing the desired concessions.

Until the last year, the railroads have pursued a liberal policy in this matter, and a generous patronage has well repaid them. Happily, this year the meeting is so located that no single road can bar them from a like liberal policy. We anticipate that such arrangements will be made that the profession will appreciate the inducements offered, and that there will be a very large representation at the annual meeting. Let every member of the Association who designs to attend, at an early date indicate to Secretary Atkinson the number of tickets he may wish to secure and his lines of travel.

It may seem to individual members a little matter, but the aggregate will be very helpful in securing final results.

DR. HOLMES has recently been moralizing over length of days as the reward of correct living. He is reported to have said that "Death to the aged man wears as pleasing a face as sleep does to one who is tired."

EDITORIAL NOTES.

HOME.

A NATURAL TURKISH BATH has been discovered near Salida, Col. In digging a well not far from the Wellsville Hot Springs a cave was struck with apartments similar to the rooms of a house, the heat being so intense as to cause a veritable sweat-bath. The largest room was 20 feet long, 10 feet wide and 10 feet high, and the walls and ceiling perfectly smooth.

MEDICAL ASSOCIATION OF LIFE INSURANCE DIRECTORS.—An organization has been formed among the medical directors of life insurance companies. Twenty companies were represented at the first meeting. which was held in New York City in December. The Association has for its object the promotion of medical science as applied to life insurance. Dr. J. M. Keating, of Philadelphia, is President and Dr. J. Frank Wells, of Boston, Secretary.

DR. T. J. W. BURGESS has been appointed Medical Superintendent of the new Protestant Insane Asylum of Montreal.

BALEFUL EFFECT OF IDLENESS UPON PRISONERS.—The annual report of Prison Superintentent Lathrop, of New York State, presents an official statement of the deplorable results of enforced idleness upon convicts, "in an unprecedented death-rate and an unequalled numerical lapse into insanity." A year's experiment with a law passed in 1888 to meet the clamors of the "friends of labor" has demonstrated that it is the height of cruelty to the prisoners to suspend the usual industrial operations in the State prisons. The prisoners have appreciated this result long before the law-makers and our citizens generally; and when at Sing Sing prison it became known to the former that an authority had been procured for the modified reintroduction of employment, a shout of joy went up from the convicts, and they began to importune their keepers to antedate or anticipate the day of their farewell to idleness. The four chief consequents of the prison labor law of 1888 were an increase of insanity, a higher death-rate, a shattered *morale* and an unprecedented deficit in earnings as compared with expenditures. At the close of the prison year, September 30, the total number of inmates in the three prisons was 3,480, of which 219 were classed as insane criminals, or about one in 15. The present Legislature will be called upon to provide for the reorganization of the labor law for convicts, and wipe out the baneful experiment of 1888.

THE MEDICAL MIRROR.—The initial number of this new magazine is at hand. It is replete with original articles, each possessed of special value, and together representing some of our foremost medical writers. We anticipate that the purposes set forth in its prospectus and in the present number will be more than realized. Under the editorial control of Dr. I. N. Love, we are sure that it will quickly command an extended circulation and a liberal patronage, and that it will prove in every way helpful in the growing field of American medical journalism. We welcome it as an exchange and wish for it abundant success.

FOREIGN.

LA GRIPPE.—The epidemic of influenza, or la grippe, which has been raging in Paris, is on the decline.

QUININE AND ANTIPYRIN FOR THE CURE OF INFLUENZA.—A cablegram has appeared in the daily papers to the effect that the eminent physician of London, Sir Oscar Jennings, relies wholly upon quinine and antipyrin for the cure of influenza; the former drug to kill the microbe, the latter one to quell the pain. Also that Dr. Jennings denominates la grippe as "a bastard pulmonary rheumatism." The advocacy of antipyrin in the papers, and in other ways, has practically resulted in the absorption of the supplies of that drug held by the wholesale druggists of the country. The price has advanced over 100 per cent. in sixty days.

A NEW PROFESSOR OF ANATOMY AT ABERDEEN.—Dr. Robert W. Reid has been made Professor of Anatomy at the University of Aberdeen. He is an alumnus of that institution and formerly a demonstrator of that branch, prior to his becoming a lecturer at the St. Thomas Hospital, London. The fact that Dr. Reid has secured this honorable appointment in the face of a spirited competition will bring to memory, for purposes of contradiction, the sinister suggestion of old Dr. Samuel Johnson, who averred that the pleasantest prospect that greets the eye of a Scotchman is the highroad to London. But here we have a Scotchman who is only too happy to find his way out from London.

TOPICS OF THE WEEK.

THE INFLUENZA EPIDEMIC IN GERMANY.

Yesterday's telegrams from various German districts give some idea of the dimensions which the influenza epidemic has attained. In Dantzic so many teachers and schoolboys are ill that only some of the usual lessons are being given in the high school, and several other schools are closed altogether. Work is partially paralysed, too, in the offices, especially in printing offices. In Hamburg several schools have had to be closed. At Wandsbeck, near Hamburg, 3,000 cases are announced, and three elementary schools are closed.

Professor Leyden, of the Charité, spoke to his students on this subject the other day. He emphasized that influenza is a disease of specific character, by no means deserving the disregard with which it is frequently treated. It must not be placed in the same category as common colds. Its special character was indicated by the suddenness and severity of all its symptoms, especially fever, and above all by its pandemic character. He declared that more than a third of the population were ill at present. He also pointed out that this complaint was very often accompanied by deep mental depression, the patient feeling intensely ill all over in a much higher degree than was usual in common colds. For this reason the treatment of the mind and feelings of the patient deserved the special attention of the physician. He discussed the points of resemblance between influenza and the dengue fever, which has been raging of late in Constantinople, Smyrna, and other Turkish cities, and favored the theory that the former has sprung from the latter, which generally spread from east to west and from south to north.

The *Berliner Klinische Wochenschrift* (Berlin Clinical Weekly) writes: "It can no longer be denied that Berlin too has been attacked by the epidemic, though it is difficult to ascertain how widely it has spread, for most of the cases which go by the name of influenza among the laity are really merely imaginary. Anyone who should reckon every slight attack of bronchial catarrh with fever, such as the season brings with it, or colds in the head and headaches, under this rubric, would have to state a very high percentage of cases in Berlin too. Whoever, on the other hand, demands a stricter diagnosis, especially whoever requires a distinct appearance of the nervous symptoms, along with the varying and complex objective symptoms, with the partly catarrhal, partly gastric, disturbances, will be more cautious with his statistics. All trustworthy observers lay special stress on the fact that there is a striking and characteristic disproportion between the objective symptoms, including even the often high but very transient fever, and the subjective feeling of illness, the weariness and depression. Real cases, however, have also been observed—in the Charité for instance—with absolute certainty, and it has been pointed out that the complaints which are notoriously wont to accompany influenza epidemics -- viz., catarrhal and croupous pneumonias — have unmistakably increased. In these cases antipyrin or antifebrin seems to have been universally prescribed, with the effect that the subjective state very rapidly improved."

A committee of eminent men, including several of the most highly reputed physicians, has been formed for the purpose of tabulating statistics of the epidemic in Berlin, and the assistance of the Statistics Office of the city has been secured.—*The Lancet.*

MICRO-ORGANISMS IN WATER.

There is a difference of opinion amongst many chemists as to whether the presence of a large quantity of bacteria or a considerable amount of organic matter in drinking-water justifies as such its condemnation. Waters containing few bacteria and little organic matter have been known to produce distinctly injurious results, while some waters containing much of both appear to be comparatively harmless in their action. Of course, very much depends upon the source of the water and the nature of its surroundings. The fact, however, that organisms believed to be agents in bringing about certain diseases exist in water for a long time, during which their activity is preserved, makes their absence distinctly desirable. Certain operations in nature would seem to indicate this. Investigations have shown that more bacteria are usually present in rivers than in lakes, in spite of the fact that lakes themselves in many cases are more or less polluted by rivers passing through populous towns. In a very interesting paper in the *Zeitschrift für Hygiene*, 1889, 86, B. KRUGER considers that this rapid decrease in the number of organisms may very possibly be due in part to the action of direct sunlight, but in the main to the tendency of water in a comparatively undisturbed state to deposit and precipitate. He therefore carried out a number of experiments with a view to determine how far the removal of organisms was brought about by the mere mechanical deposition of inert matter and also by precipitation as a result of chemical action. The mechanical precipitants employed, all in a state of fine powder and sterilized, were alumina, brickdust, clay, chalk, sand, coke and charcoal. Water obtained from an ordinary service pipe was impregnated with a liquid containing bacillus growth of a species incident to tap water. This was divided into two portions—one for precipitation with the inert substance and the other untreated for the sake of comparison. Experiments were similarly carried out in which precipitation was obtained as the result of chemical action such as is brought about by the addition to the water containing naturally lime, magnesia, etc., of substances like wood ash, sulphate of alumina, and slaked lime. The general conclusion come to by the author from the results obtained is that undoubtedly large numbers of bacteria are carried down by inert substances merely sinking in water, but that the action is very considerably increased when, in addition to mechanical deposition, a chemical precipitation also takes place. The corollary is evident—inert substances do mechanically assist in the precipitation of micro-organisms, but preference should be given to chemical treatment.—*The Lancet.*

PRACTICAL NOTES.

HOW TO LOOK FOR TUBERCLE BACILLI IN SPUTUM.

Ehrlich's method, somewhat modified, is as follows:

Press a little of the suspected sputum between two cover-glasses so as to get a very thin layer. Dry the cover-classes separately, either by moving them through the air or holding over a flame or by passing a few times through the flame. This fixes and dries the preparation. Place some drops of analine oil in a reagent glass half-filled with water, shake, and filter into a watch glass. Add several drops of an alcholic solution of fuchsin or methyl violet to the contents of the watch glass till they are markedly colored. Warm this mixture till it begins to smoke. Place the cover-glass with the dried sputum, face downwards, on the warm liquid and let it float from three to five minutes. Remove and rinse in alcohol, acidulated with nitric or hydrochloric acid, until very slight traces of color remain; then rinse in ordinary alcohol (70 or 80 per cent). Dry the cover-glass as before by holding above a flame, clean it where necessary, add a little pure glycerin and set under the microscope. An enlargement of 400 diameters will show the bacilli if present.—*Col. and Clin. Record.*

EMBALMING.

The best process of embalming is called the "Brunelli Process." The circulatory system is cleansed by washing with cold water till it issues quite clear from the body. This may occupy from two to five hours. Alcohol is injected so as to take out as much water as possible. This occupies about a quarter of an hour. Ether is then injected to abstract the fatty matter. This occupies from two to ten hours. A strong solution of tannin is then injected. This occupies for imbition from two to ten hours. The body is then dried in a current of warm air passed over heated chloride of calcium. This may occupy from two to five hours. The body is then perfectly preserved and resists decay.—*Sanitarian.*

TREATMENT OF ERYSIPELAS.

DR. KOCH treated numerous cases of erysipelas with the following ointment:

Creolin	ʒ i.
Iodoform	ʒ iii.
Lanolin	ʒ i.

This ointment is spread as an even smooth layer over the affected skin and its surroundings, on an area of at least two to three inches to the outside of the inflamed parts. The whole is covered by a piece of mackintosh. Dr. Koch selected creolin in the above prescription because he thought that it was possessed of first-class disinfectant properties, without sharing the dangerous after-effects of carbolic acid. Iodine, which is derived from the decomposition of iodoform, stimulates absorption of inflammatory products. Lanolin has been chosen because it penetrates the skin best of all ointment bases.

DETECTION OF PUS IN THE URINE.

Drop into the specimen of urine enough tincture of guaiac to give it a milky appearance, and heat it a few minutes to 100 deg. Fah. If pus is present, a blue tint will develop. Otherwise the urine may be passed through a white filter, on which is then allowed to fall a few drops of tincture of guaiac, producing, if pus is present, a distinct blue discoloration.—*Pharma. Era.*

CULTURE OF VACCINE VIRUS.

A Russian physician has succeeded in cultivating vacine virus, and finds that the virus, artificially cultivated, is as effective as the genuine, and has the advantage of absolute purity, so that its use involves no danger from scrofula, tuberculosis or other constitutional diseases.—*The Pacific Record.*

FOOD FOR GASTO-ENTERITIS OF CHILDREN.

In the *Lyon Médicale*, a writer advises the following food in gastro-enteritis of infants:

Wheat	1 tablespoonful.
Oatmeal	½ "
Barley	½ "
Water	1 quart.

This is to be concentrated by boiling to one pint, strained and sweetened. The result is a mucilage readily taken by children. In gastro-enteritis the patient should be given small quantities of this mucilage at frequent intervals, and no other food administered until the stools assume their normal color.—*Dietetic Gazette.*

ARTIFICIAL LABOR.

Induction of artificial labor is done simply by a method recently brought out by Pugliatti, but which the translator has practiced many years with satisfactory results. Patient is brought to the edge of the bed, a bivalve speculum is introduced, and an antiseptic injection administered. A clean aseptic, elastic bougie is gently introduced as far into the uterus as it will pass; the remainder is coiled up in the vagina. If pains do not begin in three hours another vaginal injection is given and followed by the introduction of a larger bougie.—*Times and Register.*

SOCIETY PROCEEDINGS.

Obstetrical Society of Philadelphia.

Stated Meeting, Thursday, October 3, 1889.

DR. THEOPHILUS PARVIN IN THE CHAIR.

(*Concluded from page 67.*)

DR. THEOPHILUS PARVIN reported

A CASE OF TUBAL PREGNANCY, WITH SPECIMEN. —PROBABLE DIAGNOSIS, AND REMOVAL PRIOR TO RUPTURE.

Mrs. Mary E. W. was brought to the hospital of Jefferson Medical College, September 19, suffering from a probable ectopic gestation. She is 26 years old, married seven years, and has had three living children, all of whom she has nursed, and during each lactation menstruation has regularly occurred; her youngest child is thirteen months old, and she is now nursing it. About June 29 the usual flow began, but has continued ever since, with brief intermissions, under the use of medicines given by her physician, Dr. Horrowitz. In the latter part of August and in September, she has suffered somewhat from nausea; and this, with some other things, would have led her to believe she was pregnant, had not the hæmorrhage from the uterus been so constant. About September 1 she began to suffer with occasional violent attacks of pain low down in the left side, followed by much soreness; these attacks were especially liable to occur when she lifted her child.

Because of the temporary absence of Dr. Horrowitz from the city, she went some three or four times to the dispensary of the Pennsylvania Hospital, where she was examined by Drs. Baldy and Bradford, who found a tumor on the left side of the uterus, tender and cystic, with a history of almost continuous bleeding for some weeks, there being, however, no signs of any shreds; pain in the lower part of the abdomen; only very meagre symptoms of pregnancy. A probable ectopic gestation was diagnosed and operation urged.

The day that she came to Jefferson Hospital, she had with the hæmorrhage a discharge of small, membranous fragments; whether decidual or not, of course could only be certainly known by microscopic examination. A day or two before some similar fragments were discharged, according to her statement.

Upon examination, I found a tumor adjacent to the uterus upon the left side, the uterus somewhat enlarged, and very great sensitiveness to pressure, both in the vagina and in the lower part of the abdomen, especially at the left side.

The history, the examination, and the previous examinations of Dr. Baldy, with his conclusions, gave me little doubt that the case was one of tubal pregnancy.

Abdominal section was done on September 20, Dr. Baldy being present, and Dr. W. E. Ashton assisting in the operation. The gestation cyst included in the tube was removed and the specimen is now shown you.

The patient's convalescence has thus far been uninterrupted, almost two weeks having elapsed since the operation.

DR. J. M. BALDY reported

A CASE OF TUBAL PREGNANCY, WITH SPECIMEN. —NON-DIAGNOSIS, BUT REMOVAL PRIOR TO RUPTURE.—RECOVERY.

Mrs. G. R., (colored), walked into the out-patient clinic of the Howard Hospital, July 5, 1889, suffering from pain in her abdomen, so similar to that which I have often seen go with a pyosalpinx, that I diagnosed this disease before examining her. The examination revealed a large, apparently tortuous, tender mass, posterior and slightly to the left side, giving a boggy feel to the touch. The diagnosis was verified, a saline purge given, and an immediate operation advised.

One week later a messenger summoned me to the home of the patient, where I found her lying on the bed, suffering from severe pain in the abdomen. She stated that the night before a fit of sneezing had given her a similar pain. She arose from the bed and walked to the table, a distance of about six feet. While standing there she was seized with a severe, cramp-like pain, which doubled her up, and lasted for a few moments. The idea took possession of me that she possibly was suffering from an ectopic gestation. I helped her onto the bed and made a most careful examination, which revealed the following: She had been having children at regular intervals of about two years. She had a child just a year and a half before, since which time her menstruation had been pretty regular. With the exception of an occasional "pain in her belly" she had always been well.

Before coming to me she had been bleeding irregularly for about two weeks. The show was and had been clear blood, without any signs of shreds. Her husband had been away from home for about three weeks. The pain in the abdomen had been there since the bleeding began. There was not the slightest sign of pregnancy, either subjective or objective, nor did she think she was pregnant. A reëxamination of the pelvis showed only what had been before found, viz., a cystic mass, which did not pulsate, posterior and to the left; apparently a distended tube. The uterus was in position of normal anteflexion, and there was a perfectly normal cervix for a multipara. There was an elevation of temperature, and the woman had had chills and creeps. I asked Dr. Hamill to see the patient for me and he verified my examination throughout. Together we decided

that it was a case of pyosalpinx, stating at the same time that we had thought of ectopic gestation as a possibility, but were wholly unable to find sufficient data on which to verify our suspicion.

On July 13 I opened the abdomen, with the assistance of Drs. Hamill and Naylor, and in the presence of three or four other gentlemen, and removed a left tubal pregnancy, which I here present to you. As I tore away the adhesions which bound the mass to the pelvic walls, the cyst was ruptured and a teaspoonful of black clots was discharged from the sac itself. It was evidently a pregnancy of the fimbriated end of the tube, which had become adherent to the pelvic wall, the pelvic wall thus forming one side of the sac. The case well illustrates the difficulty, nay impossibility, of at times diagnosing ectopic gestation. In three weeks the patient was sent home, and is to-day in her usual good health.

I would emphasize the following points, viz :—

The case is one of primary or unruptured tubal pregnancy. (There are now four such cases on record from this city alone, viz., Dr. J. Price's, Dr. Goodell's, Dr. Parvin's, and my own.)

The patient is a colored woman, which is rather rare.

The patient did not have a long period of sterility, but was bearing children regularly.

There was at no time a sign of a decidual discharge.

There was at no time the slightest subjective or objective sign of pregnancy.

Dr. E. W. Cushing, of Boston: The subject of extra-uterine pregnancy is one of the greatest interest to me, and I can say, from sad experience, that it is not easy to make a diagnosis. After some obscure symptoms of irregularity of menstruation, etc., a near relative was taken suddenly with a severe attack which, after the event, I felt was due to a tubal pregnancy ruptured into the broad ligament; finally she recovered without operation. This turned my attention to the subject, and I looked up the specimens in the Harvard Medical School, which Dr. Parker photographed, and I published.

In another case, of which I saw the specimen, a gentleman operated for an ill-defined tumor. The cyst was opened after the operation, and a fœtus three-fourths of an inch in length found. There had not been a suspicion of pregnancy.

I believe that almost every one agrees in regard to the difficulties of diagnosis. and I believe that pretty much every one here agrees as to the necessity for surgical treatment; yet as a subject for debate here, I would suggest in opening this discussion that there may be cases where a man may suspect extra-uterine pregnancy, but yet be not sufficiently certain to operate, or not be able to get permission to do so, or he may be unable to do an abdominal operation himself, or secure the services of one that can. I would suggest that under such circumstances the use of the faradic current is not only justifiable but prudent. This would be proper only in the earliest stages, before the fœtus has reached such development that it would leave behind a source of irritation and suppuration. I think that the condemnation of the electric treatment in the early stage has been too sweeping and severe. Certainly the horrible cases which are recorded from attempting to puncture the fœtal sac, especially at a later date are not likely to be repeated.

Dr. Wm. Goodell: In regard to the electrical treatment of extra-uterine fœtation, I must confess that I was theoretically inclined to believe in it. But when I had met with cases of extra-uterine fœtation, and I saw the mass that was present, and the adhesions and injuries which adjacent organs had sustained, I could no longer uphold it. In my opinion electricity should be reserved for those cases in which the woman absolutely refuses any surgical operation, or when the physician is not a laparotomist, and he cannot secure the services of one. The amount of adhesions is, however, so great, and the injury done the appendages so severe, that the woman cannot in any case conceive on that side. This was apparent in the case reported by me to the Society, in which I operated previous to the rupture. In this case, indeed, the appendages of the unimplicated side were so diseased as to need removal. The operation is therefore warranted, if, for no other reason, simply for the diseased tubes and ovaries. I have practically been converted to the belief that electricity, and particularly electrolysis, should not be used in these cases. The electrolytic action is a most dangerous one. Although advocated by Apostoli, the results have been most disastrous in the cases in which it has been tried.

Fifteen years ago, in a case which I now believe was one of extra-uterine pregnancy, I punctured the tumor with an aspirating needle. In a few days septicæmia set in and the woman died.

The injection of morphia, as recommended by Winckle and by others, has met with better success. But while it destroys fœtal life, it cannot cure the injuries sustained by the appendages, for which the best remedy is the knife.

I have had four cases of early extra-uterine pregnancy within a few months, all of which were successful. One I supposed to be a simple case of disease of the appendages, and operated accordingly. It had burst, and without marked symptoms. In another case of ruptured sac, the specimen was perfectly analogous to that presented by Dr. Baldy, and he was present at the operation. The history of the third case I have already given to the Society, and I presented the specimen. I diagnosticated the ectopic pregnancy and operated before rupture. The fourth case was one of

interstitial pregnancy, on which I operated the day before I went to Europe. The woman was brought to me by her physician, with the history of hæmorrhages and great suffering, but with none of pregnancy. Her physician thought that the tumor was either a fibroid or a polypus. I found a fluid tumor bulging into the endometrium, and slightly dilating the os uteri. My diagnosis was a necrotic intra-mural fibroid tumor. Using Adams' subcutaneous saw, I cut into the mass, and removed a quantity of grumous blood and broken-down fragments. These latter were examined under the microscope and found to be placental tissue. The subject of extra-uterine fœtation is of great interest, not only before and after rupture, but also in relation to the cases that go to term. I shall never forget the first case of extra-uterine fœtation that I saw. It was the classical case of the late Dr. Parry—the one which led him to write his admirable essay on the subject.

A distinguished surgeon was called in. This was in the days when we made marked distinction between pelvic cellulitis and pelvic peritonitis. He diagnosticated the case as one of pelvic cellulitis. There was heat and great pain, with complete immobility of the womb. The patient did not improve, and I was called in, and diagnosticated the case as one of pelvic peritonitis, which in one sense it was, as the subsequent history will reveal. My treatment was not satisfactory, and I lost sight of the case. Several weeks afterward, while I was confined to my house for a few days by an illness, Dr. Parry came to see me. He sat down by my side, and after asking about my health, he referred to this case, and pointing his long forefinger at me, said, "You have made a great blunder." He then told me that he had been called in the day before to see the case, and that he considered the case one of normal pregnancy, for he had heard the heart sounds with the utmost ease; in fact, had never heard them so distinctly before. I said to him: "Dr. Parry, of course you are right in the theory of pregnancy; but depend upon it, there is something wrong, for I can hardly think that either Dr. —— or myself could have made such a mistake without some good reason for it." The time for labor came, but it did not set in. Then the death of the child occurred, Dr. Parry was now again sent for, but this time he was unable to find the os uteri, so he sent for me. With great difficulty I found the cervix above the pubic bone. We then made the diagnosis of retroverted gravid uterus. At the next visit, it intuitively flashed across my mind that it was a case of extra-uterine fœtation, and then the case was clear enough. To clinch the diagnosis, Dr. Parry introduced a hypodermic syringe needle and drew off some amniotic fluid. In a few days the head bulged down into the vagina, and we could distinguish even the sutures. We wished to incise the vagina and deliver the child with forceps; but the woman refused an operation, and died. At an autopsy, Dr. Parry withdrew the sac and fœtus, and exhibited them to this Society. Not long after this I saw a second case. The woman had passed full term, the child had died, and yet labor did not come on. Her physician, much puzzled, called me in. In this case the cervical canal was open, and suspecting extra-uterine pregnancy, I passed my finger into the uterine cavity and found it empty. The case was seen by one or two other physicians in consultation with us. We were anxious to operate, but the husband would not permit it, unless we could assure him positively that his wife would recover. While waiting the woman suddenly died.

The third case I saw a number of years ago in a mulatto. The child was living at the time that I operated. There was no difficulty, either in the diagnosis or the operation. The child, being hardly viable, gasped a few times and died. I did not dare to remove the placenta, and as the umbilical cord was very large, I made the mistake of leaving it in the lower angle of the wound as a drainage tube. The woman died a few days later, and at the autopsy we found the liver and lungs riddled with pyæmic abscesses.

I operated on another case in which the fœtus must have died at the age of six months. The woman was perishing from blood poisoning. She was emaciated, had high temperature and night sweats. Pus was evidently present somewhere, and I diagnosticated the tumor as a suppurating ovarian cyst. What perplexed me was great resonance in front. At the operation this was explained by the presence of the gases of decomposition. Excessively fœtid pus escaped. I removed the fœtus, the bones of which, with the scalp and umbilical cord, were the only parts intact. The placenta was not to be found. The woman died suddenly from supposed heart-clot, after a violent altercation with her husband.

Not long after I was called to Mount Holly to see a case which had been correctly diagnosticated by the physician. I removed a petrified seven months' child. The patient had albuminuria, but did well until the eleventh day, when uræmic convulsions set in, and she died comotose. All these operations were performed before the days of antiseptic surgery, and I have not since seen a case of advanced ectopic gestation.

I believe that Tait is correct in explaining these advanced cases by the rupture of the tube and the escape of the unbroken gestation sac into the fold of the broad ligament. The behavior subsequently is precisely like that of an intraligamentary ovarian cyst.

In regard to early diagnosis, I should say that the most common symptom is the arrest of menstruation for one or two periods, followed by ir-

regular uterine hæmorrhages. It is true that pelvic colic is a common symptom, but not so common as the other. But I do not know that it is necessary to make an absolute diagnosis; given a woman with the exacting symptoms of a suspected extra-uterine fœtation, who has a displacing tumor on one side of the womb, are we warranted in operating merely to remove the tumor, whatever its nature? Do we not constantly, on less provocation, remove pelvic tumors whose character is determined only by the operation? Instead of an extra-uterine fœtation, we may find pyosalpinx, or an ovarian abscess; but were we not in duty bound to perform the operation, even at the risk of an error in diagnosis?

DR. BARTON C. HIRST: I was some time ago called to a case in consultation which presented a clear history of extra-uterine fœtation; cessation of two periods, hæmorrhage with the discharge of deciduous membrane, a distinct tumor to one side of the uterus, and the subjective signs of pregnancy, with swelling of the breasts and vomiting. Dr. Hamill and myself urged operation, but the family being dissatisfied, we were discharged. Another physician was called, and Dr. Parrish was consulted. He recommended the use of electricity, and a current was applied with relief of the symptoms, and, I believe, complete cure of the patient. There may be a varicose vein in the broad ligament which having burst may present all the signs of extra-uterine fœtation after rupture of the sac. I have had two such cases; in one case I opened the abdomen and found a blood-tumor in the layers of the broad ligament, and considerable blood in the peritoneal cavity. From the history and physical signs, I am quite sure that this was not an extra-uterine pregnancy.

I saw, in consultation, a fatal case of this kind after labor a short time ago. The labor was a difficult one and ended by craniotomy, There was rupture of the vein in the broad ligament. The bleeding was first between the layers of the broad ligament. This then ruptured into the peritoneal cavity and the woman died. There was no rent in the uterine wall. Such cases might be mistaken for extra-uterine fœtation.

DR. M. PRICE: In most of these cases, all that we can make out is that there is something which should be removed; but as to a distinct diagnosis of extra-uterine pregnancy being made, I do not believe that it is done one time in ten. Dr. Parvin, in his case, would not have been surprised to have found distension of the tube from any cause. In a case which presented all the symptoms of extra-uterine pregnancy, and where I expected to find this condition, I found a pair of large pus tubes. I have seen twenty or twenty-five cases of extra-uterine pregnancy, nearly all of them ruptured tubal pregnancies. It does not interest us a particle whether the cases were diagnosed or not. There is trouble present of such a serious character that it does not become us to lose a single moment. Most of these cases come into the coroner's and not the surgeon's hands. Delay in operating is adding 10 per cent. to our mortality. It is our duty to operate on the first indication, and if we are mistaken, to thank God for the absence of so serious a condition.

DR. JOSEPH HOFFMANN: I have twice operated for extra-uterine pregnancy and did not find it. I operated once for something else and found extra-uterine pregnancy. The first case presented the signs of extra-uterine pregnancy to even a more marked degree than that of Dr. Hirst— coming on after a sterility of eight years, a retroverted mass, flooding and violent pain. At the operation I found two pus tubes. She was pregnant and miscarrying and completed it after the operation. The second case was almost on a par with this. In the third case I operated for pus tube and found extra-uterine pregnancy. The trouble is, that these men who claim positive diagnosis do it from a single case, which, though by no means certain at the time of operation, resolves itself into an absolute diagnosis when they come to publish it. It is the dreams and the nightmare of desire to publish something startling, which make the diagnosis. There are such a variety of conditions in the pelvis giving rise to these symptoms that it is impossible to say absolutely what we have. I have gone over Dr. Thomas' list of cases and found that, so far as absolutely correct early diagnosis is concerned, it is worth nothing. In only one case, if my memory serves me, was there a post-mortem. In three or four in which death occurred there was no post-mortem; and in the others, where the current was used, the diagnosis in most of them was made after symptoms of rupture.

The treatment by the electric current is advocated by Reeves, who strangely falls into a fallacious argument. He says that if we use electricity in cases where there are symptoms of extra uterine pregnancy, and these symptoms disappear after the use of the current, why not call them extra-uterine, as we do in other diseases, where diagnosis is made, and a line of treatment adopted with good results, and illustrates the argument by the use of mercury in syphilis. If the effect of electricity was as well established as that of mercury in syphilis, the argument would be more logical. When we feel that rupture has occurred, electricity is a dangerous thing to trifle with. The principal danger is in delay. The longer the growth is allowed to continue, the greater the danger from adhesions, rupture and complications which cannot be foreseen.

DR. J. PRICE: There are some interesting facts in connection with the history of this subject. It is curious that a few years ago a man with an experience of one doubtful case should discuss

the subject before the American Gynæcological Society. It is also curious that the same man, with a single experience with a woman sterile five years, having pelvic pain, irregular menstruation, a delayed period for six days, and recurring attacks of pain, should claim to have killed the fœtus of an extra-uterine pregnancy by the use of electricity for ten *séances* of half an hour's duration each, on consecutive days. Then follows another man with a history of one case, and another in consultation. The man with an experience of one case used electricity, and the case passes into the hands of another, who writes to the first that he is going to operate. The first physician at once writes not to do it, as he has killed the fœtus; while the operator already holds in his hands a large hydrosalpinx.

Dr. Baldy, in a recent paper in the New York *Medical Record*, lays down certain propositions, and makes the diagnosis easy in many cases. He has forgotten that many of these patients die as if with a ruptured aneurism before the woman suspects that anything is wrong. These cases go to the coroner. In the cases that reach the surgeon the hæmorrhage has not been so great.

It is interesting to refer, in this connection, to the cases of Dr. Edis and Dr. Bantock. Dr. Edis found on one side an extra-uterine pregnancy, and on the other a small ovarian cyst. Dr. Bantock found on one side an extra-uterine pregnancy, and a pus tube on the other. I have here an enormous tubal pregnancy, with rupture at the pavilion, and the abdomen filled with blood. On the other side was a beautiful hydrosalpinx.

One of the prominent cases on record I saw a few hours before the operation. We agreed that there was a doubtful history of extra-uterine pregnancy, but no prominence was placed upon this point. It might have been a small ovarian or dermoid cyst, or a large hydrosalpinx. When the abdomen was opened, every one expressed great surprise at the presence of tubal gestation. The same case has flourished over the world as a case of positive diagnosis. This is the case in which letters were written inviting different men to the operation; but the letters were written after the operation. This case will not bear close scrutiny. If we look over the Transactions of the American Gynæcological Society, we shall find that the men who have had the least experience speak most positively.

DR. NOBLE: Monday, a week ago, I removed an extra-uterine pregnancy which was rather unusual in the conditions present. In my case, the woman had skipped the period in August. There was nausea, and other symptoms of pregnancy. In September, a week before the sickness should have occurred, she began to flow freely; then had cramps and fainted in the street, and afterwards had fainting attacks. I saw her two weeks after the beginning of the flow. At one time, while in the water-closet, she passed what she thought to be a large clot. The opinion of her physician was that she had had a miscarriage.

I found a mass on the left side pushing the womb to the right. I recommended operation, which was not consented to for some days. In the meantime the hæmorrhage continued. The patient was seen by Dr. Kelly, and we agreed that it was almost certainly an extra-uterine pregnancy. At the operation I found the blood in the peritoneal cavity. The blood was almost entirely clotted. The ovum was attached not far from the uterus. The hæmorrhage had taken place in the tube, and the clots had been forced out through the fimbriated extremity. On the other side there was a hydrosalpinx. She had also had the rectal tenesmus. She has done well since the operation.

DR. B. F. BAER: I wish to go on record as one who believes that it is as easy to diagnose extra-uterine pregnancy as to diagnose any other condition within the abdomen (as hydrosalpinx or pyosalpinx) positively. But the man who says he can make such a diagnosis positively, is an unsafe man. Dr. Taylor assisted me some five years ago in a case of extra-uterine pregnancy in which the diagnosis was made. The fœtus had advanced to the age of two and one-half months, and the symptoms which have been mentioned were present. There was enlargement of the uterus, and I heard the placental bruit. I felt fluctuation in this sac, and was almost certain that I detected ballottement. I, however, operated in an unscientific way, cutting through the vagina. I got the embryo, but the patient died.

DR. M. PRICE: Did I understand Dr. Baer to say that he heard the placental bruit at two and one-half months?

DR. J. M. BALDY: How did Dr. Baer detect ballottement at this early stage?

DR. BAER: I have heard this murmur in normal pregnancy at two and one-half months. I believe that it is not yet clearly understood whether the murmur is placental or simply a uterine murmur. It is, however, due to pregnancy.

In regard to ballottement, given a sac filled with liquor amnii and an embryo dangling in it, I think that ballottement could be readily detected.

DR. WILLIAM GOODELL: Dr. Baer is right in regard to early ballottement. This is said to be detected much earlier in extra-uterine fœtation than in natural pregnancy.

DR. J. M. BALDY: I know there are cases on record, but I doubt the occurrence of ballottement in these. It could not possibly have occurred in such specimens as that presented by Dr. Goodell a few months ago, or those of Dr. Parvin and my own presented to-night. And so it has been with all the cases I have seen. Reference has been made several times to a paper of mine in the New York *Medical Record*, in which I lay down three propositions. The first is that, in a certain pro-

portion of cases of extra-uterine pregnancy in the early stages, the diagnosis is easy and unmistakable. The second, that in a certain (quite large) proportion of cases, sufficient symptoms are present to more than warrant a diagnosis of extra-uterine pregnancy, such a pregnancy not being present. The third, that in a certain other proportion of cases the symptoms, until rupture has occurred, are entirely wanting or are of such a dubious character as to in no wise warrant such a diagnosis. These propositions have been abundantly sustained by the cases reported to-night. Cases have been reported in which the diagnosis was made and the condition found, and there are enough of these cases on record to show that the diagnosis can be made at times. Then we come to the second group of cases, in which the diagnosis is justified by the symptoms, but something else is found. This I sustained by cases of my own, and it has been more than abundantly substantiated by cases reported here to-night by Drs. Goodell, Hirst, J. Price, M. Price, and Hoffman. Dr. Johnston, of Washington, has reported a similar case. The third proposition is also sustained by cases reported to-night (in addition to my own) by Dr. Hoffman, Dr. J. Price, and others. If there are well substantiated cases in which the diagnosis was not made and extra-uterine pregnancy found; and again, if we operate for extra-uterine pregnancy, the symptoms justifying such a diagnosis, and something else is found, I cannot see how any sensible man can claim that it is possible to make a positive diagnosis. I agree with Dr. Hoffman that Dr. Thomas' cases are utterly worthless from a diagnostic point of view; nor does Dr. Thomas himself hold that it is always possible. The men who claim that a positive diagnosis can be made have most signally failed. For instance, the case of Mann, of Buffalo, which went into the hands of Wylie, who operated and did not find ectopic gestation; the case which Buckmaster, together with other medical talent, treated with electricity, even to puncturing, I think, and finally pronounced normally pregnant; the case of Kelly, of Philadelphia, the diagnosis of which case has to-night been denied by two eye-witnesses, as well as others.

It is noteworthy that the men who claim the most on this subject, have had the least experience.

BOOK REVIEWS.

THE NATIONAL MEDICAL DICTIONARY, including English, French, German, Italian and Latin terms used in Medicine and the Collateral Sciences, and a Series of Tables of Useful Data. By JOHN S. BILLINGS, A.M., M.D., LL. D., Edin. and Harvard, D.C.L. Oxon., Member of the National Academy of Sciences, U. S. A., etc., etc. With the Collaboration of W. O. Atwater, M.D., Frank Baker, M.D., S. M. Burnett, M.D., W. T. Councilman, M.D., James M. Flint, M.D., J. A. Kidder, M.D., William Lee, M.D., R. Lorina, M.D., Washington Mathews, M.D., C. S. Minot, M.D., H. C. Yarrow, M.D. Philadelphia: Lea Brothers & Bo., 1890.

It was fitting that with the advent of the new year a work of such value should be presented to the medical profession. From the exceptional ability of those to whom its preparation had been committed the public had just reason for anticipating the production of a work of unusual merit. We congratulate the editor and his corps of collaborators upon the fact that such anticipations are fully realized. The profession is deeply indebted to the author for this invaluable contribution to American medical literature.

The series of tables, ten in number, with their various subdivisions, published in connection with the work, will be found of great practical value, and evince a wise discrimination of what is most needed in the matter of ready reference. We only purpose at this writing to announce the publication of this great work, and assure our readers that it is within their power to make an invaluable addition to their libraries by the purchase of the National Medical Dictionary. In a later number of THE JOURNAL we shall take occasion to refer more fully to its special merits.

In the publication of the Dictionary the well known firm of Lea Brothers & Co. have fully maintained the credit of a house which for more than two generations has been foremost in the presentation of medical publications. In every department and every detail there is such evidence of skill and exquisite taste as not only to redown to the credit of the house but also to the honor of a prominent American industry.

EATING FOR STRENGTH; OR, FOOD AND DIET IN THEIR RELATION TO HEALTH AND WORK. By M. L. HOLBROOK, M.D., Prof. of Hygiene in the N. Y. Med. College and Hospital for Women; Editor of the *Herald of Health*, etc. New York: M. L. Holbrook & Co. Cloth, Pp. viii, 246. Price $1.00. Chicago: A. C. McClurg & Co.

In this book the various food products are carefully analyzed and compared with a view to pointing out the most eligible articles of diet in both health and disease. The writer is evidently a good deal of a vegetarian and takes particular pains to emphasize the importance of adding largely to our diet the vegetable products, to the partial exclusion of meat, as tending both to the promotion of health and economy. Several hundred recipes for the preparation of foods and bev-

erages are included in the work, which is written throughout in a very instructive and entertaining manner.

THE INTERNATIONAL MEDICAL ANNUAL FOR 1890 is now in press and will shortly appear from the publishing house of E. B. Treat, New York. The prospectus shows a list of thirty-seven editors and gives promise of improved work in the present edition. The volume will give a summary of new remedies arranged in alphabetical order, together with a *résumé* of new treatment and medical progress. The work will doubtless be an important addition to medical literature. It will be published in one volume of 600 pages. Price $2.75, post free.

A CLINICAL ATLAS OF VENEREAL AND SKIN DISEASES, including Diagnosis, Prognosis and Treatment. By ROBERT W. TAYLOR, A.M., M.D., Surgeon to Charity Hospital, New York, and to the Department of Venereal and Skin Diseases of the New York Hospital, etc. Illustrated with 192 Figures, many of them Life-size, on 58 beautifully colored Plates. Also many large and carefully executed Engravings through the text. Parts VII and VIII. Pp. 319–427. Philadelphia: Lea Bros. & Co. 1889.

These are the last two numbers of Taylor's superb work and include the following subjects: Scabies, Dysidrosis, Miliaria crystallina, Impetigo contagiosa, Eruptions of Iodic Origin, Bromine Eruptions, Sycosis, Molluscum Sebaceum, Ichthyosis, Leprosy, Lichen Planus, Lichen Ruber, Lichen Ruber Moniliformis, Lupus Vulgaris, Molluscum Fibrosum, Scleroderma, Acne Rosacea, Rhinoscleroma, Elephantiasis, Leucoderma, Chloasma, Alopecia Areata, Keloid and Xeroderma Pigmentosa.

This concludes a work of the greatest value to the general practitioner and surgeon, for by its aid the diagnosis of skin lesions, which is often attended with so many difficulties, becomes comparatively simple and easy. A more helpful work could scarcely be chosen for a physician's library.

ASSOCIATION NEWS.

American Medical Association—Forty-first Annual Meeting.

Section of Laryngology and Otology.

All those who desire to read papers before the Section of Laryngology and Otology, at the next meeting of the American Medical Association, to be held in Nashville, Tenn., May 20–23, are requested to send the titles of the same to either of the undersigned before February 15, 1890.

JOHN O. ROE, M.D., Chairman,
28 N. Clinton St., Rochester, N. Y.

FRANK H. POTTER, M.D., Secretary,
273 Franklin St., Buffalo, N. Y.

MISCELLANY.

LETTERS RECEIVED.

Dr. H. J. Defrees, Millwood, Ind.; Parke, Davis & Co., Detroit, Mich.; Medical and Surgical Sanitarium, Battle Creek, Mich.; Egan Imperial Truss Co., Ann Arbor, Mich.; Dr. L. Belknap, Battle Creek, Mich.; Dr. A. B. Judson, New York; Dr. J. McGinn, Washington, D. C.; Dr. G. H. Gibson, Denver, Col.; Dr. Walter Wyman, Dr. L. C. Loomis, Washington; Dr. J. H. Manley, Gustave E. Stechert, New York; E. P. Donnell Mfg. Co., Chicago; Fairchild Bros. & Foster, J. Walter Thompson, New York; Dr. Archibald Church, Chicago; Dr. S. A. Skinner, Hoosac Falls, N. Y.; Dr. Dudley P. Allen, Cleveland, O.; Dr. W. C. Owen, St. Louis, Mo.; Mrs. Stinson, Norristown, Pa.; R. A. Robinson & Co., Louisville, Ky.; E. Merck, New York; Mr. M. R. Ledberry, Detroit, Ill.; The Imperial Granum Co., New Haven, Conn.; The Kenyon News and Postal Subscription Co., Chicago; Dr. Wm. W. Pearce, Waukegan, Ill.; Dr. Wm. N. Boerstler, Peninsular, O.; Dr. F. D. Green, Richmond, Ind.; Mrs. E. T. Bruen, Philadelphia; Dr. G. E. Browne, Las Animas, Col.; Medical Press Co., Philadelphia; A. H. Roffe & Co., Boston; McKesson & Robbins, New York; Lambert Pharmacal Co., St. Louis, Mo.; Horlick's Food Co., Racine, Wis.; The Upjohn Pill and Granule Co., Kalamazoo, Mich.; Dr. J. Stout, Ottawa, Ill.; Landa, de St. Sauveur & Co., Chicago; Paris Medicine Co., Paris, Tenn.; Dauchy & Co., New York; Detroit College of Medicine, Detroit, Mich.; Sharpe & Dohme, College of Physicians and Surgeons, Baltimore, Md.; Doliber, Goodale & Co., Boston; Rio Chemical Co., St. Louis, Mo.; Buffalo Med. and Surg. Journal, Buffalo, N. Y.; J. Movius & Sons, I. Haldenstein, New York; Dr. A. B. Campbell, New Holland, Ill.; Dr. N. D. Guerry, Trinity, Miss.; Canton Surgical and Dental Chair Co., Canton, O.; Dr. F. S. Bascom, Salt Lake City, Utah; Dr. S. K. Gifford, Haverford College, Pa.; Dr. S. P. Deahofe, Potsdam, O.; Dr. L. J. King, Visalia, Cal.; Geo. F. Lasher, Philadelphia; Dr. L. C. Swift, Ft. Barrington, Mass.; Worcester District Medical Library, Worcester, Mass.; Dr. W. E. Casselberry, Chicago; Dr. Henry B. Baker, Lansing, Mich.; Chesebrough Mfg. Co., New York; P. W. Garfield, Cleveland, O.; Dr. John Casson, Alexandria, La.; F. B. O'Connor, Brooklyn, N. Y.; New York Post-Graduate Medical School, New York; Battle & Co., St. Louis, Mo.; Dr. A. Palmer Dudley, New York; Dr. J. A. Maloney, Washington.

Official List of Changes in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from January 4, 1890, to January 10, 1890.

By direction of the Secretary of War, ordinary leave of absence for two months is granted Capt. Junius L. Powell, Asst. Surgeon, in extension of the leave of absence on account of sickness granted him in S. O. 258, November 5, 1889, from this office. Par. 1, S. O. 1, A. G. O., January 2, 1890.

By direction of the Secretary of War, leave of absence for six months on surgeon's cestificate of disability, with permission to go beyond sea, is granted Capt. Louis M. Maus, Asst. Surgeon. Par. 13, S. O. 4, A. G. O., January 6, 1890.

First Lieut. Freeman V. Walker, Asst. Surgeon U. S. A. (Jackson Bks., La,), is granted leave of absence for one month on surgeon's certificate of disability. Par. 7, S. O. 5, Div. Atlantic, January 7, 1890.

Official List of Changes in the Medical Corps of the U. S. Navy for the Week Ending January 11, 1890.

P. A. Surgeon Robert Whiting, detached from the "Minnesota" and to the "Dale."

Asst. Surgeon Geo. McC. Pickrell, detached from the "Dale" and to the "Minnesota."